Volume 14, No. 2

March • 1959

Industry

Range Management

Scientist and Land-Use

Storm Damages

Soil and Anthrax

Education

Literature Reviews

SCSA News

Convention Facts

"What's a fair price for fertilizer?"

ANYONE who checks into fertilizer prices finds out in a hurry that there is a wide spread in prices. And even though most of us are aware we only get what we pay for, it's still natural to wonder if higher-priced fertilizers are really worth the extra cost. You've probably been asked about it at one time or another.

Whether or not it's wise to pay extra depends, of course, on what is in the fertilizer. This is where a little extra knowledge of fertilizer ingredients and how they work can be a big help.

For example, all potash is not alike. Two sources are muriate of potash and sulphate of potash. Depending on analysis, a fertilizer with sulphate as the potash source may cost $6 to $10 more per ton than one with muriate. If you're not familiar with the difference in performance of these two potash forms, you might decide on the lower-cost fertilizer.

But when you study the difference in yield performance between sulphate and muriate of potash, the picture changes considerably.

Tomatoes ship better

Tomatoes fertilized with sulphate of potash have a lower water content than those fertilized with the muriate source, according to Duke University tests. It means firmer tomatoes that pack and ship better, go through with less damage and spoilage . . . quality advantages worth much more than the small extra cost of a fertilizer ingredient.

Potato quality difference

Research shows sulphate of potash markedly improves starch content and increases specific gravity of potatoes. Curiously, it even takes less cooking oil to make french-fried potatoes if the potatoes have been fertilized with sulphate of potash. It's just another measure of the extra quality potato growers harvest when they rely on sulphate of potash rather than muriate.

Affects potato russetting

Studies show that Russet Burbank potatoes grown with sulphate of potash had 69 percent russetting over more than one-half of their surface area. In one experiment, sulphate of potash increased the uniformity of russetting and improved the market appearance of the russet potato. These benefits plus the advantages of a higher specific gravity potato make sulphate of potash a better fertilizer ingredient buy.

Bean yields improved

Identical fertilizer treatments of lima beans, varying only the potash source, again verified the extra value of sulphate of potash.

Fields fertilized with the muriate source of potash produced yields approximately equal to the average in the test area. With sulphate of potash, however, yields of shelled beans were nearly doubled. Another interesting point: The sulphate form of potash produced higher yields of shelled beans with less vines and pods.

Tobacco quality improves

The University of Kentucky reports ". . . when too much muriate is used, the chlorine taken up by the plant injures the quality of tobacco." Sulphate of potash contains less than 2.5 percent chloride and is generally recommended by experts as the correct source of potash for tobacco. The sulphur which it provides is important, too, now that sulphur in the soil is being depleted in many areas. The pay-off: high quality tobacco which brings premium bids from buyers.

Extra cost well repaid

Whatever the crop, sulphate of potash brings measurable benefits . . . improved quality, better yields, more profit per acre. And since the $6 to $10 more per ton that it costs (over the muriate form) amounts to only $1.50 to $2.00 per acre, it's easy to see that in nearly all cases sulphate of potash is one measure of a fair price in fertilizer.

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VOLUME 14
NUMBER 2

JOURNAL OF SOIL AND WATER CONSERVATION

TO ADVANCE THE SCIENCE AND ART OF GOOD LAND USE

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CHANGE OF ADDRESS: Notice of change in address should be received two weeks before the date of issue on which the change is to take effect. Both the old and the new address should be sent to the Executive Secretary.

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POST OFFICE ENTRY: Second class mail privileges authorized at Des Moines, Iowa.

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COVER: The soil conservationist-scientist keeps his feet on the ground, his auger and spade in the soil and his hand-level on the slope. The Journal salutes the soil field men who are one part of a complicated science. These highly-trained technicians map the foundation facts on which modern soil and water conservation land-use plans are formed.

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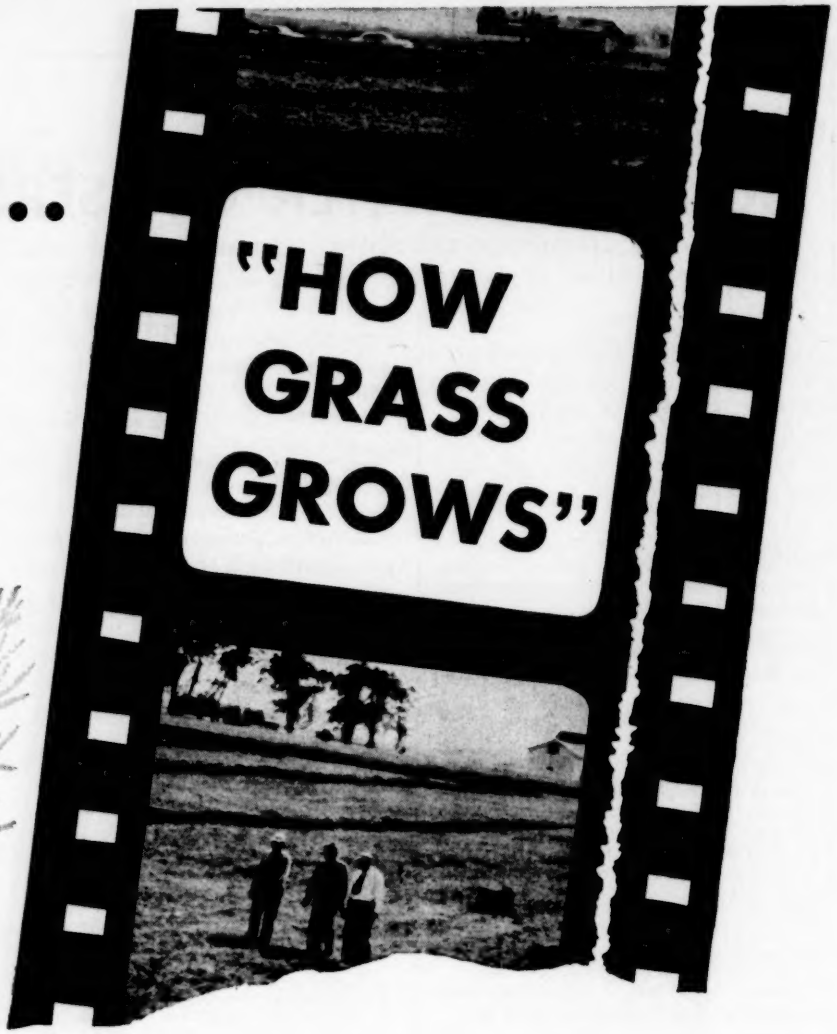

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Industry's Role in Conservation

MORRIS E. FONDA

Figure 1. Industrial technology has become complex but within all parts there are many opportunities for practicing and supporting conservation.

INDUSTRY plays an important role in conservation. I should like to trace briefly a short cross-section of the development of American industry in the United States. The complexity of industry as we know it today represents a newer and more rapid development than that of much of our agricultural technology, and most of it occurring within this country . . . particularly within the last three decades.

Today's American industry was born in small shops throughout the country and in areas of high population centers well before the turn of the century. These little shops were searching for better and more economical ways to fill the needs of an ever-increasing population. The country blacksmith and the farmer inventor were integral parts of this picture. Then, as know-how and population both grew, the small shop turned into the *job* shop, carrying on special activities for certain needs. Perhaps it was forging to be done, some construction work, some mineral elements to be put together, or the multitude of other things which formed the early stages of the American enterprise as we know it today.

Morris E. Fonda is sales manager, Harvestore Division, A. O. Smith Corporation, Kankakee, Illinois. He is a Fellow of the SCSA and a past president.

This paper is an adaptation of Fonda's talk given October 22, 1958, at the 13th annual convention held in Asheville, North Carlina.

The idea of improvement over improvement—of better ways of doing things—grew and grew, until today we find scattered throughout the U. S. A. many *industrial* enterprises ranging from small concerns to huge industrial giants which serve national and international markets.

Today, the American industrial concern exists because it performs a service (or services) and furnishes a product (or products) at a profit. Therefore, it has in its initial stages the *element of creation* . . . or ideas. Perhaps the average corporation will not classify this as a creative segment of their enterprise, or have called it engineering. Nevertheless, from ideas are created tangible products or services. These products are assembled and field tested so that it can be determined that they have practicable and economical application.

Secondly, in most companies there is a segment of the enterprise that *procures the raw material,* either in processed or semi-processed form, that goes into the making of the product.

Then there is a third element of a corporation that deals with the *production or manufacturing phase.* Here the idea has been formulated; the ingredients for manufacturing the product have been assembled; the tools and the plant and the personnel are organized to manufacture the product.

I am sure that most of you have seen the *production lines* of a modern-day factory and are aware that a tremendous amount of planning goes into the development of such manufacturing facilities. The ability to *mass produce* at an acceptable price is dramatically illustrated by these production lines.

Then we come to the fourth element of this enterprise that deals with *distribution* or *marketing.* A population must be able to secure a product to meet needs and desires. Modern distribution involves a complexity of mar-

keting levels from the distributor, the warehouse, the dealer, the retailer and other groups which pass the product on to the consumer.

A fifth and final segment is the *financial element* which provides the necessary means so that the product can be properly moved through the various channels of distribution. The necessary financial resources must be provided not only for distribution of products but for the total industrial enterprise.

How Does Conservation Fit?

From this brief outline of these elements of industry one can more fully appreciate the complexity of modern-day industry and begin to analyze where conservation of resources fits into the pattern.

● Take, for instance, the creation of a product. Is it designed so that the material and human resources which are required to make it are supplied in an intelligent manner? We have, for example, observed changes made during the past few years in food containers. In many instances it is quite likely there has been a saving of certain of our non-replaceable resources by substituting the type of resource which is in greater abundance or which can be grown from the soil and originates from a renewable resource.

In European countries, diesel fuel is used instead of high-octane gasoline energy. Or elsewhere, gas has been substituted for coal; plastics for metals. There are many more examples where an idea or the creation of a product has a very direct result on resource use.

In considering the relationship of production and conservation, in our whole manufacturing process, the matter of conservation of raw and processed materials is of the utmost importance. Most companies of any size watch quite carefully their percentage of scrap. I know that this is true in my own particular company and scrap waste is held down by taking corrective steps. Here is an opportunity for real conservation and improved techniques.

Even in the area of marketing, there is great need for conservation. You have often heard the term "over-sold". Modern means of creating a desire to buy can conceivably result in purchases which are quite non-essential, and do not necessarily contribute either to the welfare or the economy of the people involved. In our high standard of living, where we enjoy so many of the things which tend to make our life more pleasant, the proper use of resources which make up these products is a matter of intelligent use, the same as in the conservation of soil and water.

And, do we really practice conservation in our everyday living? Observe the bulging garbage cans, closets

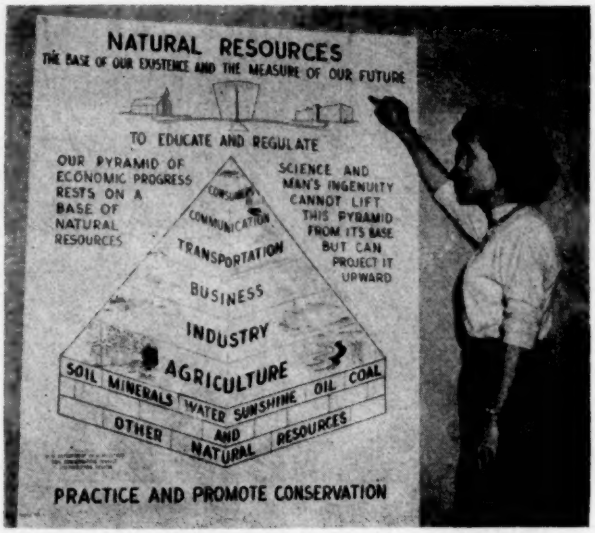

NATURAL RESOURCES
THE BASE OF OUR EXISTENCE AND THE MEASURE OF OUR FUTURE
TO EDUCATE AND REGULATE
OUR PYRAMID OF ECONOMIC PROGRESS RESTS ON A BASE OF NATURAL RESOURCES
SCIENCE AND MAN'S INGENUITY CANNOT LIFT THIS PYRAMID FROM ITS BASE BUT CAN PROJECT IT UPWARD
CONSUMER
COMMUNICATION
TRANSPORTATION
BUSINESS
INDUSTRY
AGRICULTURE
SOIL MINERALS WATER SUNSHINE OIL COAL
OTHER NATURAL RESOURCES AND
PRACTICE AND PROMOTE CONSERVATION

Figure 2. A South Carolina teacher makes use of this USDA-SCS chart to show the inter-relationship of USA economy and industry's strong role.

full of unused clothes, rusting equipment, dripping faucets, litter, and a multitude of other places where intelligent resource-use is not being practiced. In other words, we do not necessarily measure what we secure in terms of our actual needs.

Therefore, I believe there is real need for enlarging our concept of conservation to deal with those aspects which go into the design, processing, distribution, use, and related phases of our free enterprise system. If conservation implies the intelligent use of natural resources for the benefit of all people involved, then what I have suggested are certainly parts of conservation which we should not disregard.

Enlightened Citizenry Needed

● There is a second aspect of industry's role in conservation which I think is of utmost significance. This deals with the whole matter of an enlightened urban as well as rural population. I am sure that members of the *Soil Conservation Society of America* are quite conscious of the need for *all* people to be completely aware of conservation of resources. It is a human trait to view those things which are directly and very closely associated to each of us as individuals as the most important matters of our livelihood. A person who works in a factory and lives in town associates himself with those things which are in his type of environment. How do one's thoughts about an environment get extended? How do we learn to reach out beyond our immediate surroundings?

I am sure that most city people no longer feel that a

quart of milk is something that originates in a bottle or carton. However, I question quite seriously whether enough of our urban population comprehends the fact that the cow which produces the milk must feed on products which come from a healthy and perpetual land and water base. Similarly, lines of interdependencies apply to the furniture in our homes, the automobiles we drive, the television we watch, and all other aspects of life as they relate to our well-being.

To me there is a real challenge for the *SCSA* to develop means of communication which are so dynamic that they will stimulate and inspire people in industry to initiate programs designed to acquaint *all* of our people with the importance of conservation of soil and water and other resources. I think the time is ripe for the *SCSA* to initiate such a program. I say this even though I think the job is probably more difficult now than it has ever been. The competition for time, as it relates to securing the attention of *management* people who will make decisions, is keener than ever.

Now is the time to improve methods and skills in communication. There appears to be an increasing awareness of the need for communication efforts which will be of interest and significance to all people in industry. It seems to me that conservation education with urban and industrial groups is an important aspect of a program which will aid in getting management and labor onto a common working ground for the benefit of all people.

It is not my intent to suggest or spell out programs which might be introduced. There is ample talent in the *Society* to develop such programs. However, I would issue one word of warning. In order to capture the attention of people these days, when it is so easy to flick on the television or go to some type of entertainment, I believe the methods of communicating our ideas are extremely important. No longer should we depend on mere lectures or verbal discussions. The science and art of communication should be more fully studied so that any programs evolved would be certain of a high degree of absorption and benefit. This certainly means more and better use of audio and visual materials and many other media of communication to get across the conservation concepts from one group to another. And, let me recommend that our suggestions be reasonably tangible and concrete.

Industry Support Forthcoming

● A third aspect of industry's role in conservation deals with industry's relationship to those conservation organizations or groups which are not only furthering national welfare but also industrial welfare. There is no question in my mind that industry should be supporting intelligent and reputable conservation efforts. The question rests as to methods and means of getting this job done—how to convince industry that this support should be forthcoming.

In gaining this support, it seems to me that whether we like it or not we must recognize an element of selfishness. Competition is a characteristic of today. Most

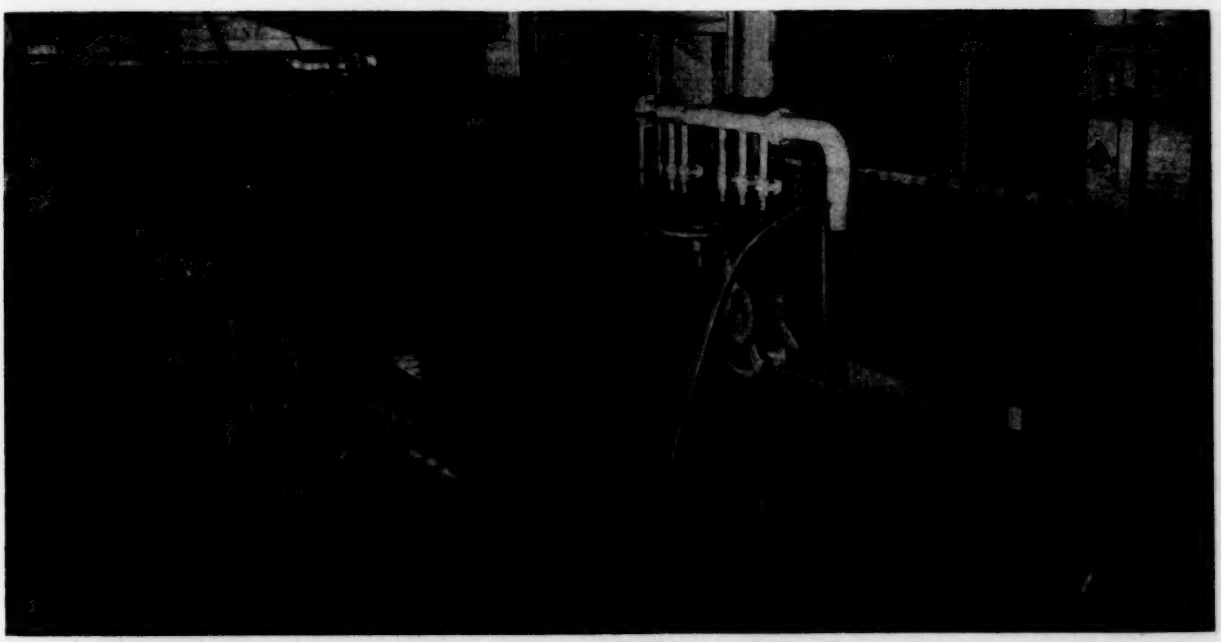


Figure 3. Paper-making industry depends largely on raw materials that come from forest lands. Conservation measures are increasingly being applied throughout all phases of this industry. These measures make up a complex story and few people know, even superficially, their full extent.

companies are not supporting outside activities unless they are quite directly related to their own interests. Therefore, the job becomes one of showing and convincing industry that support of any reputable and recognized conservation organization is to industry's own interest.

Here is a real challenge and opportunity for the *Society* to create those kinds of information and material (factually based) which will relate the importance of conservation to several broad areas of industry.

In setting up a factual basis, let us examine *vertical integration*. I am wondering if we do not have a good selling point in soil and water conservation in showing that farmers who practice the wise use of their land also produce more at less cost. (In a way, vertical integration in agriculture as we know it today is motivated by a deep interest in securing certain products or commodities for the consumer in a more economical fashion. Starting with the consumer, this movement works backward through the processor to the producer or farmer, and the credit facilities involved.) In a sense, farmers are vertically integrating themselves and by so doing they are able to turn over their production to a processing plant or associated industrial enterprise in a more competitive market. This is of direct interest to industrial concerns involved. Even though the permanence of land and water resources may be of greater long-time importance, nevertheless, it is my opinion that industrial concerns are now more interested in conservation as it relates to the economics of the product.

There is another challenge which I think is rightfully that of the *Soil Conservation Society*. I am sure that with the ingenuity which is represented in the *Society* we can devise approaches to industry which will enlist support not only to the *Society* but to other worthwhile conservation organizations. Such support is a responsibility which I believe belongs to industry. It is a matter, therefore, of selling industry on this responsibility.

Conservation Needs to Be Extended

There are other related aspects of conservation which may help in selling industry and in getting a more complete job done on the farms and ranches.

A soil and water conservationist who is assisting a farmer in developing a better plan for the use of his land and water resources has an obligation which goes beyond the mere operational aspects of the plan. It seems to me there has been and is a tendency to stop our thinking at a point where a particular function ceases. In farm planning, I believe the responsibility of a soil conservationist or associated professional person cannot cease with the practice of contour farming or the establishment of good rotations or other conservation measures. A farmer may produce the best grass in the world to hold the precious top soil; but unless this forage is properly harvested, utilized and finally marketed, it is conceivable that the purpose of conservation is only partially fulfilled, or may fail entirely.

To be more specific, it is not enough that a farmer grow a legume or grass to hold the soil, however fundamental this is. It is likewise important for him to cut at the proper time such as in the pre-bloom stage, when his feed values are at a maximum. It is important for him to utilize and feed this crop properly. I have seen many instances where crops which were grown to conserve the soil were literally thrown away in utilization and feeding.

Nor can we turn our back upon marketing.

If one of these aspects of the farm economy becomes a weak link, the whole chain can be broken. Therefore, I would like to challenge the people who are in the professional field of agriculture, and specifically soil and water conservation to lift their eyes from the land and to welcome a broader vision of conservation.

When soil conservation got its initial national impetus in the United States, we had very little of factual information to guide us—there was no history. I can recall in my early days in the Soil Conservation Service when we mentioned terracing, that deep furrows came to the farmer's brow and heads were shaken at such an unorthodox practice. We were not daunted by resistance. We believed we could get a job done; and we did.

Summary

There are three broad areas which I feel are representative of industry's role in conservation:

- Industry can practice more conservation in the design, procurement, production and marketing of products. This can have tremendous effects on the intelligent use of natural resources now and in the future.
- Industry has a real opportunity and obligation to work with the masses of employees within its organizational structure to acquaint them more thoroughly with natural resources and the need for all aspects of wise use.
- Industry has a very definite role to play in support of conservation efforts which transcends its own internal interests by giving strong assistance to organizations such as the *Soil Conservation Society of America*.

In each of these there is a greater job to be done in communicating with industry on facts and responsibilities. In our complex society, industry must more thoroughly recognize and accept responsibilities. Those of us who are engaged in or interested in conservation likewise have a much broader role to play than we have hitherto.

Range Management the Last Quarter Century

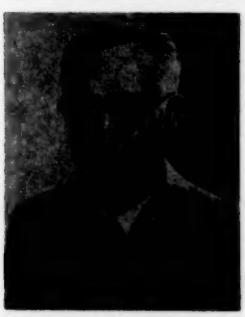
ROBERT V. BOYLE

RANGE MANAGEMENT is a relatively new science —it is much newer than forestry, for instance, or agronomy. Possibly, pasture management in humid countries like England is not new, but when we speak of range we think primarily of our Western states, dry sections of Central and South America, and parts of the Old World such as Spain and the Mediterranean countries.

The grazing of domestic livestock is as old as history, but very little has been done toward the improvement of ranges by management until the twentieth century. Many of our National Forests were created during the first ten years of this century, following enactment of the Forest Reserve Act in 1891. It was in the 1930's that the Soil Conservation Service, the Bureau of Land Management, and the predecessor of the Agricultural Conservation Program were established. Most soil conservation districts were organized during the 1940's, and the American Society of Range Management is just eleven years old!

Regulation of the public ranges by the Grazing Service, now the Bureau of Land Management, has had a tremendous influence. As long as grazing on the public domain remained unregulated, range use was a "dog-eat-dog" proposition. Every rancher was out to get what he could; if he didn't get it someone else would. The Taylor Grazing Act made possible the establishment of individual allotments, the control of tramp sheep outfits, and the elimination of trespassing livestock—much of it wild horses and burros.

I have been intimately associated with the technical aspects of range management for nearly 35 years, and I confess to having some personal opinions regarding its progress. As a check against my own judgment, however, I devised a short one-page questionnaire regarding progress in range management and mailed copies to more than 40 people in five states—Utah, Colorado, New Mexico, Texas and Arizona. The questionnaires were sent to nine Soil Conservation Service employees; to ten State Agricultural College people; to seven representatives of Federal land administering agencies; to the presidents of ten cattle and sheep growers' associations; to chairmen of five Range Management Society sections and to a few others, such as land management companies and state land offices. Over two-thirds of those receiving the questionnaire responded. This paper summarizes the replies.



Robert V. Boyle is state conservationist, SCS, Phoenix, Arizona. His discussion is based on a talk he gave before the 11th annual meeting of the American Society of Range Management at Phoenix, January 29, 1958.

Areas of Improvement

The respondents believe that progress has been made during the past 25 years. The consensus was that a quarter of a century ago about 15 per cent of southwestern ranchers were practicing reasonably good range management, but now about 45 per cent understand range management and are doing a reasonably good job in practicing it. These figures are *averages;* there was a considerable variation in individual opinions.

From personal experience, I agree that significant improvement has been made in range management. Good range management is the grazing of each range area with that number of livestock during those seasons that will result in an improvement in and maintenance of proper range condition. There has been betterment over the years in all these respects.

Those who replied to the questionnaire agreed almost unanimously that the most important management practices are those related to rate of stocking. They rated proper degree of utilization of forage as the most important single management practice. Opinion was divided as to whether the proper distribution of livestock over the range or proper season of use was second in importance. They were agreed that kind of stock was the least important factor.

Some Reasons for Improvement

There were a number of reasons for the trend toward improved range management included in the answers to the questionnaire.

Wealthy men who buy ranches often practice good range management. These men, according to local opinion, can better afford the "luxuries" associated with proper range use. Consequently, people have come to believe that outside capital is an important factor. Very few of those replying to the questionnaire agree with that theory. Many ranchers, wholly dependent on livestock income, are improving their ranges. It is doubtful that independent income is of great importance in the practice of range management.

On the other hand, there was almost unanimous agreement that *natural* progress on the part of ranchers, or the

"school of hard knocks", is a powerful influence. Unquestionably there are a number of secondary factors. Cattle are now sold by weight instead of by the head. This has convinced many ranchers they must have good grass to get extra pounds; and to get good grass they must practice range management. Banks and other financing agencies have frequently had a constructive influence. To progressive livestock loan advisors, cattle alone are not enough—the rancher has to show enough forage on his range to sustain cattle at least through the loan period.

Still another element in the "school of hard knocks" is the realization by cattlemen that they cannot afford to maintain a herd of *wild* cattle. Thirty or forty years ago, many Southwestern ranges were infested with such "critters". It is certain that range management has been made easier with the elimination of wild cattle, restocking with gentle ones and managing in such a way as to keep them gentle. To manage a range requires management of cattle, and wild cattle cannot be managed in a rough, brushy country.

These are just a few aspects of "experience" progress in range management on the part of range users.

Technical Assistance Rated Highly

Another influence given considerable weight was the technical assistance given to ranchers on private and state lands in soil conservation districts. (Questionnaires were not sent to soil conservation district supervisors.) It is not surprising that technical assistance was listed prominently, because in some states soil conservation districts have been in existence for twenty years.

District programs do not provide for "telling" the rancher how he is to manage his range or how many cattle or sheep he is to run. Rather, such programs provide for a technician to assist the rancher to make range site and range condition surveys, to analyze soil erosion, water supply, poisonous and noxious plant problems, and other related problems. Usually this technical assistance is furnished by the Soil Conservation Service. The technician and rancher jointly consider solutions to the problems. The range technician takes advantage of every

Figure 1. A good rangeland has components of fertile soil, plants, water, supplementary forage, and quality stock. Range management, although well-started, has barely scratched the surface.

opportunity right there on the ground to explain the fundamentals of plant growth, plant physiology and plant-soil-moisture relationships. It is always the rancher who makes the final decision in regard to such matters as numbers of livestock, distribution, season of use and deferred-rotation grazing.

The Agricultural Conservation Program has also exerted considerable influence. It has made possible the development of livestock water needed to get better distribution of livestock over the range, the construction of needed fences and stock trails, ridding ranges of undesirable trees and shrubs, and reseeding depleted ranges.

The influence of federal land administering agencies such as the Forest Service and Bureau of Land Management is, of course, significant. These bureaus are required by law to regulate use of the range. Stockmen resented regulation in the early days, but time has healed most of the wounds. Range research by the Forest Service has provided a great deal of valuable information and just about everyone knows that range management was pioneered on the National Forests.

Many present-day ranchers and ranchers' sons have gone to state agricultural colleges. This is recognized as a strong influence toward better range use. Agricultural college experimental and extension workers have been effective.

During the past ten years the American Society of Range Management has made its impact, and it is wielding a stronger influence every year. That is as it should be, because the objective of the Society is *"to foster advancement in the science and art of grazing land management . . ."*

Replies to the questionnaire indicated that livestock associations have exerted relatively little influence on the progress of range management. This is understandable because most such associations were organized a number of years before range management was generally recognized as a science. It is probable that most association statements-of-purpose are silent on the subject. It is suggested that here is room for modernization.

Questionnaire correspondents indicated that farm and ranch magazines were probably a minor factor in the early advancement of range management. Twenty-five years ago reference to anything that related to range management or the improvement of range lands could hardly be found in such publications. Today this is all changed. It is a rare issue nowadays that does not have at least one or more articles on these subjects, frequently prepared by ranchers, as well as technicians. And, advertisements reveal an understanding and growing awareness of the importance of range management.

It makes little difference whether a man owns or leases range or has it by benefit of permit. If he knows that the benefits of range protection will accrue to him, he will be much more willing to initiate and maintain range management practices. A rancher with control of his range does not intentionally mismanage it. Most ranchers believe they are conservationists—that they are using their ranges properly. However, their standards of proper range use and those of range technicians do not always agree. It is through the coordinating influences of such organizations as the Society of Range Management, soil conservation districts, cattle and sheep growers' associations, and other groups that these standards will be brought closer together. Inevitably, there will be some compromise.

There is one entity—Mother Nature—which will not compromise. In the final analysis, the standards of what constitutes good range management will be dictated by the requirements of plant growth which are governed by natural law. The horticulturist, the agronomist, the forester, and others—all have to recognize this. Ranchers in all probability will do likewise.

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The Scientist and Land-Use Policy

CHARLES E. KELLOGG

THE ROLE of the scientist in shaping land-use policy is only vaguely conceived by either scientists or other people. Nor do I propose to lay out in this short paper a specific role for the scientist, for governments, or for managers. Rather, I want to suggest a few points to think about.

By "science" I mean a systematic way of finding things out. It is a method for discovering and organizing the facts of the world around us in order to develop principles that allow us to predict future events under specified conditions. Science is also a great and growing body of facts and principles. Although oversimplifying a bit, I should say that a "scientist" is one who is accomplished in the use of the scientific method and who contributes to the body of principles of prediction value.

Few people use science directly. The facts and principles developed by scientists give rise to invention and technology. Now the scientists deal with things, to be sure, but to get ideas and new principles. The technologist, on the other hand, accepts the principles and applies them to practical programs. He deals with ideas to get things.

Although it is easy to distinguish science from technology in concept—and this distinction is important—in practice the distinction is not easy. Actually, many scientists work partly also as technologists. Many applied scientists, finding a lack of basic principles for their work, get deeply into basic scientific research.

Thus in speaking generally of the effects of science we usually include the technology that science has made possible. Most commonly people are acquainted with the results of technology, not with the science back of the technology. They see electric motors, chemical fertilizers, hybrid corn, and similar inventions from natural science. They understand a corporation with limited liability, the TVA, soil conservation districts, and similar inventions from social science without understanding the basic social science in the background.

By land-use policy, I assume that we include the whole body of common and statute law, traditional uses of tax and police powers, and governmental assistance, incentives, and penalties that govern the occupation and use of tracts of land and the transfer of their tenure, rights, and limitations.

A great many laws and regulations of city, county, and state governments, and of the national government, affect land use and are thus a part of land-use policy.

Take for example the traditional role of the market in allocating the use of resources. When the price of peanuts went up during the last war, more land was used for peanuts. The high market price of wheat just after the war brought range lands under the plow. The relative increase in pulpwood prices caused a shift toward forestry. And so on. Thus does the market change land use; and manipulation of this role of the market manipulates land use.

Although a large part of the laws and regulations that affect land use are not directed specifically at land use, they are really parts of the body of land-use policy. Crop quotas and marketing agreements are examples. Programs for fire control have stimulated private forestry. Tariffs on certain goods have reduced their import into our country, thus reduced the sales of certain American farm products abroad, and consequently the use of land for these products. Commonly, laws or programs for local objectives conflict with more general objectives. For example, irrigation to promote economic development in certain counties may conflict with other programs to reduce aggregate agricultural production in the whole country.

These are merely examples of the many laws and regulations that I regard as parts of land-use policy. I realize that it is hard to define the policy generally. Because of this some have even said that the United States has no land-use policy. To me this is an absurdity. Some people may not like it; others may not understand it; much of it is indirect; it is not all written down in one place; but certainly it exists.

Land-use Change

Land-use changes have been going on in the world for a long time. Many have been very painful to people;

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some have improved the land, and others have reduced its quality. Prior to the rise of modern science the only guides to policy were historical precedents based on trial-and-error. When people moved from one kind of environment to a contrasting one, or when the environment itself changed, the farmers often failed. Certainly some considerable pain is inevitable in land-use change.

During most centuries of man's existence on this Earth, changes in techniques were slow. Then after the travels of Marco Polo in the thirteenth century, modern science began to make itself felt in two ways: (1) The great explorations opened up new areas all over the world, especially to Western Europeans who had inherited the Roman concept of responsible citizenship and who were destined to develop from it the set of democratic ideals we associate with Thomas Jefferson; and (2) the development of technology made the individual more efficient economically, more healthful, and more comfortable.

Man's economic efficiency—output of goods and services per man-hour—started to rise, gradually at first, but with ever increasing acceleration. There were not only increases in production for each man-hour per acre of rural land, but also great increases of efficiency in industry, transport, medicine, and other fields that affect land use indirectly. Besides a great host of technological developments from natural science, there were many inventions from social science, such as new kinds of government, the joint-stock company, new banking and credit institutions, and trade unions.

By thus bracketing together social inventions and technological inventions I do not mean to conceal their important differences. We all know that social inventions are less readily accepted by society than technological ones and, once accepted, are extremely difficult to change. It is said that military leaders start new wars with the weapons of the old wars. Similarly, we are inclined to try to solve the economic problems of one generation with the economic tools developed by an earlier generation. (This thought is most ably developed by John Kenneth Galbraith in his book, *The Affluent Society*. Houghton Mifflin. Boston. 1958.)

The great lack of evenness of these developments is obvious if we contrast, let us say, Belgium, China, Peru, and the United States. Then, too, they were uneven within our own country. During the middle of the last century technology favored the development of the American Middlewest in contrast to the South. Several scholars in agriculture understood the reasons and explained them. Although economic pressure on the rural populations in the East and South was heavy, new lands in the West furnished an outlet for this pressure during all the nineteenth century and for the first decade of the twentieth. Then about 1910 new land came to an end almost with a bang. People had to make use of what they had.

World War I delayed the inevitable adjustment in land use because of the unusual demands of the market for farm products. But once that war was over the squeeze was on. Technology had little to offer the South to help it compete with the Middlewest and the Great Plains. The soils were infertile. Many were subject to further deterioration by erosion. Fertilizers were expensive. A livestock industry was not practicable.

Changes in the South

Most of us know the history of much of the Southeast during this period with declining cotton yields and prices. Many rural people were forced into other occupations or into other areas.

Then, beginning in the thirties a whole series of things happened. Technologists learned how to make pulp out of southern pine. They learned how to make and to distribute the cheap electric power that made refrigeration practicable. Improved chemical technology resulted in continual improvement in fertilizers and steady declines in their prices. The soil chemist learned how to test soils for nutrient requirements. Plant breeders trained in genetics developed new and productive grasses. New big machines made earth moving for water control easier. New pumps, pipe, and nozzles made irrigation practicable.

The South now has an entirely new land-use potential undreamed of 25 years ago. Excess of outputs over inputs is rising faster in the South than the average for the country. There is, of course, a long way to go for rural people to capture this great potential abundance and efficiency. But the potential is there. Land-use adjustment in the South might have been entirely different had technology been able to furnish the combination of techniques in 1918 that it could in 1948. Tremendous economic losses could have been avoided, along with pain and soil erosion.

Modern science laid the basis for both changes—the changes that reduced the competitive advantage of the South earlier and that are now raising it. Of course, this is only one example. We can find others in any rural community in any part of the world where men struggle at all to improve their material and cultural well being.

Can Science Help?

The obvious question is, could some of this pain have been avoided by the more careful application of a scientific knowledge to the development of land-use policy? I think it could. But one is always reminded that hindsight is better than foresight. Also, one is reminded that technological change is made more easily and more rapidly than social change. It took real courage and a great depression to convince people that it was not immoral to manipulate the market in a conscious effort to effect land-

use changes, as it had taken great moral courage earlier to establish the principle of the cooperative.

As we look around us now we see the effects of uneven development, not only regionally, but also functionally within a given enterprise.

Let me illustrate: Enormously increased use of new chemicals, new machines, new seeds, and all the rest have greatly increased the importance of capital in farming. Traditionally, the factors in farm production are land, labor, capital, and management. The relative importance of capital and management have enormously increased. Those managers who lack modern management skill are going out and will continue to go out of agriculture. We find increases in farm size. We find an increase in vertical integration under which the farmer becomes a kind of hired hand, or at best a contractor. Perhaps this is the way we should go in agriculture. As an agrarian, I obviously do not like it. If we must have vertical integration in order to remain efficient, I should prefer it were done through cooperatives than through joint-stock companies. But perhaps I am wrong, old-fashioned. But the whole point is that we see these and other changes: Do they need to be so painful as they have been in the past?

What Can the Scientists Do About It?

This is a very difficult question. Certainly we cannot put scientists in "control" of land-use policy. Nobody can be in "control" in a democratic state. I have no reason to believe that an aristocracy of scientists would be any better than any other kind of aristocracy, a little perhaps, but not much. In the democratic state the laws and regulations that make land-use policy are the responsibility of the people who vote and sit on juries, and their elected representatives. In our kind of government this matter is further complicated by the division of powers among the national government, state government, and the local government. All are involved.

Yet, obviously, neither the individual citizens nor their elected representatives are in position to see the implications of new technological and social inventions based on our rapidly developing body of scientific principles. In fact, the problem is getting harder all the time. Both science and technology are becoming increasingly specialized. At one time we had such people as chemists and economists. Then we had physical chemists and agricultural economists. Now we have many kinds of physical chemists and many kinds of agricultural economists.

This raises two very fundamental questions: First, how do we know whom to believe among the scientists? Secondly, what should be the relationship between the scientists who can predict the effects of alternative land-use policies with new technology and those who decide the goals of society and who legislate and administer to carry them forward?

Sometime ago I suggested a guide on this first question, "What scientists can one believe?" When it comes to scientific truth, we can say only that it is what the most competent scientists say it is. We have no human way to go back of that or beyond it. This rough guide of whether or not to believe a scientist includes four questions about him:

1. Has he followed the scientific method competently and honestly? That is, has the evidence been examined fairly and alternative explanations and theories been logically eliminated?

2. Is the scientist free to tell the truth as he sees it? Not only free of personal prejudice but also of undue influence by organizations or institutions?

3. Has the scientist's work been tested by free and open criticism? That is, what do his peers say about his ideas?

4. Has the scientist the professional respect of other competent scientists in his same field?

If the answer to any of these questions about a scientist is "no" we should be reluctant to believe him. Of course, this is not a perfect formula.

The Scientist and Planning

Certainly many competent scientists, both natural and social scientists, have principles to contribute to the development of land-use policy. This is in addition to their contributions to the technology that affects land use. We can expect many changes in both technology and policy.

Let us look at the Great Plains for example. During the early settlement of North America, English common law worked well in the East and Spanish common law in the West. It is interesting to speculate what might have happened had the English settled in the Southwest and the Spanish in the Northeast. I doubt if either could have made the necessary adjustments in time. Gradually in both the West and the East these common laws have been changed by statute law.

Neither the Spanish nor English common law fits the Great Plains, except in the moist years. And people have unconsciously regarded the drought years of the Great Plains as "catastrophes." Yet they really are not catastrophes in the ordinary sense but rather part of the normal series of events in this region. Before we can expect stability of land use in the Great Plains there must be a set of land-use policies more appropriate to the conditions there. The newly developing conservation program in this area is a step in this direction. I feel sure that policies

must be somewhat different there than those most appropriate in the humid East or in the more arid West.

Before suggesting a specific role for the scientists in the formation of such policies, I need to admit that relatively few scientists have been conscious of their responsibilities in the land-use field. I mean by this their responsibility as citizens for the use and misuse of the principles they have developed and of the technology resulting from them.

The specific role of the scientist has two aspects: In formulating the goals of land-use policy and in developing plans and proposals for policy.

The formulation of goals or policy is by no means primarily a scientific matter. Such goals involve what is "good" for society and the relations among men. Basically such matters fall in the fields of justice and morals rather than science.

But the scientists can predict the effects of policy on actions and of these actions on the goals. Although a narrowly defined problem may fall within the competence of one scientist, most problems require groups of scientists with a wide range of skills.

Legislators and managers of both business enterprises and government programs cannot hope to possess the requisite skills themselves to make such predictions unassisted. They can react to alternative plans and proposals if their probable consequences have been carefully evaluated in terms of known principles. In such planning the scientific principles of the natural sciences and of the social sciences, and the technological and social inventions, can be coordinated.

I can visualize the development of such a group to deal with land-use policy. But there are many difficulties. People are a bit suspicious of planning groups. This may be partly because of the emphasis and implication given planning in non-democratic states. In our National government, only the Office of the President and the Congress have authority for general planning. It can be argued that such a high-level planning group to deal with land-use policy should be provided for. Actually, attempts along this line have not been conspicuously successful. One reason at least is the great difficulty of staffing. The scientist needs to keep his scientific tools sharp. He can hardly be withdrawn entirely from his research and continue to be a scientist.

Actually, considerable fitting together of plans and proposals goes on between agencies and interested groups of citizens and organizations, both through advisory committees and with the Congress. Much more mutual study also goes on among agencies than is commonly appreciated.

I should be inclined to argue for a strengthening of these existing procedures. Both scientists and administrators can remain at their specialized jobs, yet be given considerable time for the planning function. They can work out possible alternatives within the staff and then discuss them with university scholars and with comparable groups from other agencies and departments. When alternatives are clear they can be further discussed with informed citizens and, of course, with members of the Congress.

The final result might be called a "compromise." In the field of land use I think of the process as a blending of the many facets of the truth about nature, morals, and justice; or perhaps we should say the nearest approximation to the truth that competent scholars of unlike experience can visualize.

Although some scientists do their best work under pressure for an immediate result, most do not. Most need time for study and reflection. They also need to follow up their hunches—their leads to new ideas—and sometimes these hunches seem to others to take them out of their fields. In fact, time for the exercise of disciplined imagination and reflection are essential to science. Extreme hurry tends to divorce knowledge from the thought that leads to those new ideas and principles that can be expected to endure the tests of the real world.

Where such an environment can be created, the scientist can make his suggestions for policy and predict the results. The useful scientist for such an effort will know that there are usually several ways to reach given results. Each way has its advantages and disadvantages.

Once the main alternatives are clarified they need to be presented objectively. In the democratic state the decision upon policy is in the hands of people, managers, governmental officers, and legislators. A few scientists may be in a position to make decisions on policy direction; but when they do, they are acting in some other capacity, not as scientists.

The development and carrying out of a program under a new land-use policy by private or public managers and technologists, is bound to lead to new experiences, new problems, and new data. These results add to the data for further scientific study, for the emergence of new relationships, and for the development of new principles. Thus the process of scientific study and the formulation of new policies repeats itself.

Such planning with the use of science is dynamic. We do not lay out lasting blue prints. Plans and principles that are good now, won't be later. In his recent book, *"The Affluent Society,"* Professor Galbraith writes: "The shortcomings of economics are not original error but uncorrected obsolescence." And, so it is for all science and technology that is relevant to the use of land by people.

Urban Impact in the Niagara Fruit Belt

ROBERT M. IRVING

RECENT papers in the JOURNAL* have emphasized the loss of agricultural land to urban and other non-agricultural development in the United States. Likewise, rapid urban expansion in certain parts of Canada has resulted in a loss of some high-quality agricultural land. Prior to 1955 no attempt had been made to resolve the problem of urban development and the accompanying loss of agricultural land. This paper treats the major problem area in Ontario and describes steps taken in an effort to integrate both urban and agricultural land use for the future well-being of the province.

* * *

Ontario, occupying 412,582 square miles, is the second largest province in Canada. It is over twice the size of California and considerably larger than Texas. Within its borders live 5.4 million people, or approximately one-third of Canada's population. Calculated on total area, Ontario has a population density of only 14 persons per square mile. The population, however, is not evenly distributed. Most of it is found in Southern Ontario (that portion of the province south of the French and Mattawa Rivers and Lake Nipissing), an area of 50,000 square miles. Excluding the sparsely populated districts of Parry Sound, Nipissing, Muskoka, and Haliburton, the population of Southern Ontario approaches 4.7 million in an area of 40,000 square miles, or 117 persons per square mile.

Even within this small area the population is unequally distributed. Almost one-half (2.1 millions) of the population is concentrated in an area of 3,000 square miles encompassing the western end of Lake Ontario. This region, because of its concentrated population and wealthy industrial character, is often referred to as the "Golden Horseshoe."

The rapidly increasing population and subsequent urban expansion have resulted in the loss of some valuable agricultural land. Planning is essential, in view of the fact that the population is growing rapidly in the "Golden Horseshoe", and that by the year 2000 it is estimated Ontario will have a population of 11 millions of which 4.2 millions will be in the "Golden Horseshoe". Planning is essential for two reasons: (1) to direct urban development where possible away from the high-quality and irreplaceable agricultural land, and (2) to make efficient uses of all services such as highways, recreational facilities, and other public services.

The "Golden Horseshoe" extends from Oshawa, on the north shore of Lake Ontario, to Niagara Falls, a distance of approximately 130 miles. It includes five urban centers: Oshawa (pop. 50,142), Toronto (1,200,000), Hamilton (239,625), St. Catharines (39,708), and Niagara Falls (23,563).

Figure 1. The Niagara Fruit Belt flanks Lake Ontario.

On the basis of population the region can be divided into two sections: the Oshawa to Hamilton belt, and the Hamilton to Niagara Falls belt. In the former the population amounts to 1.9 millions, and in the latter to 200,000.

Agriculture

Two types of agriculture are found in the "Golden Horseshoe": horticulture and dairying. Dairy farming is common in the whole region but is particularly intensive adjacent to the large cities. Horticulture, notably fruit growing and truck gardening, was formerly an important agricultural enterprise throughout the whole re-

*Norton, E. A., *"Vanishing Crop Land,"* Journal of Soil and Water Conservation Vol. 11, No. 4, July 1956.
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Figure 2. Picking peaches in the Niagara Fruit Belt. The Fruit Belt accounts for 63 per cent of the peach trees in Canada, and 73 per cent in Ontario.

gion. To a large extent the horticultural land in the Oshawa-Hamilton belt has been replaced by urban development. Fruit growing is still practised intensively in the Hamilton-Niagara Falls belt—Niagara Fruit Belt.

Agriculturalists are genuinely concerned with the urban encroachment problem in the Niagara Fruit Belt for several reasons:

- The population is increasing rapidly. From 1951 to 1956 the population increased by 26 per cent. The three major urban centers—Hamilton, St. Catharines, and Niagara Falls—are sprawling over the highly productive horticultural soils.

- The Niagara Fruit Belt accounts for a large percentage of the fruit grown in Canada. Furthermore, investigation has shown that the *combination* of soil and climate experienced in the Niagara Fruit Belt cannot be found elsewhere in the province likewise favorably.

- The Niagara Fruit Belt is the breeding ground for great industrial development in the near future. The Welland Canal, forming a vital link in the St. Lawrence Seaway system, cuts through the Fruit Belt. Undoubtedly the Seaway will attract large-scale industry resulting in further urban development.

The Niagara Fruit Belt is bounded by Hamilton to the west, Niagara Falls to the east, the Niagara Escarpment to the south, and Lake Ontario to the north. It is approximately 30 miles long, and it ranges from one to 10 miles wide.

If the Niagara Fruit Belt disappears Ontario will lose the core of its fruit-growing industry, and Canada's fruit production will be curtailed by about 50 per cent.

The Niagara Fruit Belt has a unique combination of soil and climate which makes it possible to grow tender tree-fruits (peaches and cherries) successfully. Studies have shown that the odds of tree damage and winter and spring bud-damage are less in the Niagara Fruit Belt than elsewhere in the province. Tender tree-fruits are grown successfully in certain parts of Southwest Ontario, but the risk of damage due to low temperatures in spring and winter is greater.

Thus, if it is desirable to maintain the "core" of Canada's fruit-production center, then land-use planning will have to be initiated.

Because of the rapidly increasing and expanding urban population and the disappearance of valuable horticultural soils the Ontario Department of Agriculture undertook to study the urban encroachment problem in Louth Township, one of the principal fruit-growing Townships in the Niagara Fruit Belt. (The complete report entitled, *Factors Affecting Land Use in a Selected Area in Southern Ontario,*" can be obtained from the Department of Soils, Ontario Agricultural College, Guelph, Ontario.)

Louth Township

Louth Township comprises 18,000 acres, and is situated adjacent to the city of St. Catharines. It is serviced by the four-lane Queen Elizabeth Way, by highway number 8, and by the Canadian National Railway. Within its borders are three villages (Vineland, Jordan, and Jordan Station) having a combined population of 761. With a population of 5,171, it is one of the least urbanized Townships in the Fruit Belt.

The Township can be divided into three physical divisions: the *Sand Plain,* the *Bench,* and the *Till Plain.*

The flat *Sand Plain* (9,860 acres) occupies that portion of the Township north of number 8 highway. The soils

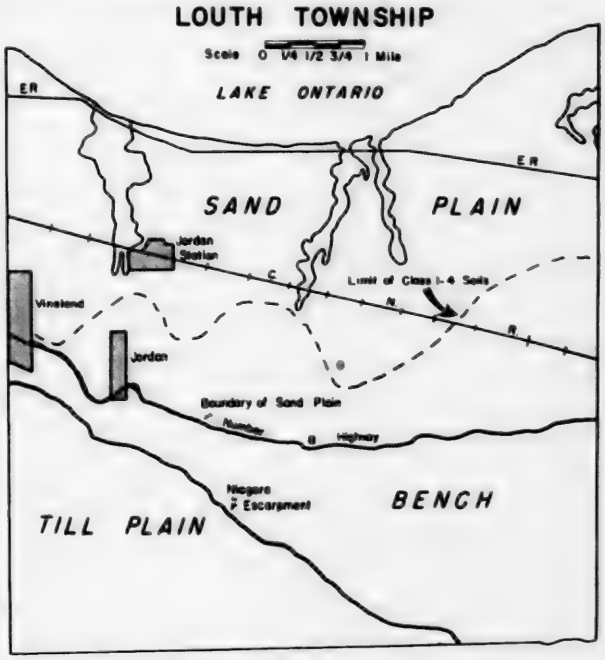

Figure 3. Author Irving studied the threats of urbanization in the Fruit Belt and presents a valid case for conservation of agricultural lands strongly based on soil capabilities, with Louth township used as an example.

are sand, sand underlain by clay at variable depths, and clay. Clay soils occupy the southern third of the Sand Plain, and the sand and sand underlain by clay occupy the northern two-thirds. Over 90 per cent of the peaches and cherries in Louth Township are grown in the northern two-thirds of the Sand Plain. The clay soils are used for crops more tolerant of wet conditions, eg., grapes, pears, plums, and apples.

The *Bench* (4,906 acres) is bounded on the north by number 8 highway and on the south by the 200-foot high Niagara Escarpment. The topography is gently undulating to rolling, with slopes frequently exceeding 20 per cent. The soil materials are chiefly fine textured clays varying from moderately well drained to poorly drained. Pears, plums, grapes, and general farm crops are the chief crops grown on the Bench. General farming and grape growing are often practiced as a combined enterprise. Because of the nature of the soil materials and the increased distance from the moderating influence of Lake Ontario, peach and cherry production is almost nil.

The *Till Plain* (3,464 acres) occupies that part of the Township south of the Niagara Escarpment. The soil, topography, and agriculture are similar to those described for the Bench.

The Survey

The Louth Township study consisted of two parts: a soil and land-use survey, and a geographic, (economic and sociological) survey. We are here concerned with the soil and land-use survey because it provides the basis for land-use planning in a rural area.

The soils were mapped on aerial photographs having a scale of one inch to 660 feet. The chief soil factors considered were soil material, drainage (five classes), depth of sand over clay (four depths), slope, erosion, and stoniness. Over 100 soil types were identified, and 42 different kinds of land use were observed.

In view of the wide range in number and kinds of soil in Louth Township it was impossible to rate each type of soil. Consequently, the soils were grouped into eight land-use capability classes according to their *productivity*, *versatility*, and *durability*, and each class was assessed as to its ability to produce the fruit crops grown in the Township — particularly the most discriminating fruits, peaches and cherries. The factors considered in grouping the soils into the land-use capability classes were *soil material*, *depth of sand over clay*, *drainage*, and *slope*. Artificial factors, such as *location*, were not considered.

Of the eight land-use capability classes, Classes 1 to 4 are best suited for the production of all fruit crops. Classes 5 to 8, due to the increased slopes, to the nature of the soil material, to the shallowness of sand over clay and to the drainage, are less versatile for all fruit crops and consequently are considered less valuable for fruit-growing purposes.

The distribution of the land-use capability classes is closely related to the physical subdivisions already described. Thirty-one per cent of the soils are in Classes 1 to 4, one-third of which are on the Sand Plain, the remainder being on the Bench and Louth Till Plain. On the other hand, 70 per cent of the soils are in Classes 5 to 8, less than one-half of which are on the Bench and the Louth Till Plain, the remainder being on the Sand Plain. There are 5,760 acres of Classes 1 to 4 lands and 12,393 acres of Classes 5 to 8.

Urban Encroachment

Although Louth Township is one of the least urbanized areas in the Niagara Fruit Belt, recent trends indicate that it is slowly becoming urbanized. The three villages are increasing in size, and semi-urban encroachment on the agricultural land is occurring. This should not be unexpected since the Township is adjacent to St. Catharines, and is easily reached by the Queen Elizabeth Way and number 8 highway. Although in 1955 less than 250 acres of farmland (excluding the villages) had been taken over by urban development, most of the encroachment occurred on the Sand Plain which contains the best soils (Classes 1 to 4) for fruit production. The encroachment is continuing in this area, estimated at about 300 acres in early 1959. Of this total about 75 per cent is on the Classes 1 to 4 soils.

There are several reasons why urban encroachment is occurring in Louth Township, particularly in the Sand Plain:

- There is a general desire on the part of many residents in the St. Catharines area to live in the country away from the crowding of the city.
- Land prices and skyrocketing taxes in the city are too high for many young people who wish to become home-owners. In the country, building lots are less costly and taxes are lower.
- The presence of the Queen Elizabeth Way and number 8 highway provide rapid and direct access to St. Catharines. In fact the location of highways is probably the most important factor in determining the encroachment pattern. Semi-urban development is particularly heavy along the Queen Elizabet Way, along parts of number 8 highway, and along the paved County road on the western boundary of the Township.

In addition to the direct loss of land, there are other less obvious but equally important effects of urban encroachment in this dominantly rural area. The most important effect on the farmer is the discrepancy in taxes. A detailed study of the assessment rolls in the Township revealed that the farmer pays three times as much in

Figure 4. Looking north from the Niagara Escarpment in Saltfleet township in the Niagara Fruit Belt. Pears and grapes grow on the fine-textured clay soils. Urbanization is scattered along highway 8, with Lake Ontario in the background.

Figure 5. Again from the escarpment one views the town of Grimsby. Urbanization here is to date relatively uncontrolled and sprawls along the highway. Queen Elizabeth Way leading to Niagara Falls shows faintly as a double band in the upper right. Lake Ontario is in the background.

taxes as the semi-urban dweller, yet both receive approximately the same in services. Indeed, most semi-urban dwellers, being used to the amenities of city living, demand and receive more in services and recreation facilities than the farmer. Moreover, due to the increasing population, Louth will soon have to form a police force, which will necessitate a further increase in taxes. The impact of these inequalities is that the dissatisfied farmer becomes more and more ready to sell off his land.

Public Opinion and Solution Sought

In an attempt to evaluate public opinion on the encroachment problem in the Township a questionnaire was placed before 25 per cent of the farmers and an equal per cent of the semi-urban people (including those living in the villages). Although the results are not conclusive they do give some indication of opinion as tallied from 222 replies which represented 25 per cent of the holdings in Louth Township.

It is interesting to note that of all those interviewed most wanted to see some urban development in the Township, but *over 90 per cent said that sandy tree-fruit soil (Classes 1 to 4) should be retained as agricultural land.*

The answers to a question dealing with the methods which should be employed to direct urban development away from the Class 1 to 4 soils (the Sand Plain) were less decisive. They ranged from restrictive zoning to the improvement of the farm economy.

Is there a way out of this dilemma? It seems inevitable and in fact essential, that urban areas expand to accomodate increasing populations. It is also inevitable that in the process of expansion a certain amount of high-quality agricultural land is going to be lost. There is no question that the Niagara Fruit Belt is a desirable location for industry and urban development. It has a well developed transportation network, it has a large and expanding labor pool, and it is situated adjacent to the fastest growing market in Canada.

Today the prevailing philosophy in Ontario is defeatist towards land-use planning. Some say, "we cannot save the Fruit-Belt, so why try!" Others say, "if we run out of fruit we can always import it." This is a dangerous philosophy to adopt. The Niagara Fruit Belt is the largest single fruit-producing region in Canada; if it disappears it is not likely to be replaced by any other area. Fortunately there are those (considered by many to be idealists), and they are in the minority, who believe that it may be possible through education, cooperation, and planning to have industry and fruit-growing side by side in the Niagara Fruit Belt. Can they co-exist? And if so, on what basis?

The Louth Township study indicates that only about one-third of the land (Classes 1 to 4 soils located chiefly on the Sand Plain) is suitable for production of the highly valued peaches and cherries. Pears, plums, apples, and grapes are not as demanding in their soil or climatic requirements and can, consequently, be grown elsewhere in the Township. Obviously, then, the Sand Plain soils must not go over to industry or urban development if it is desirable to preserve the local fruit-growing economy.

On the other hand, there is a large acreage of Class 5 to 8 land below the Niagara Escarpment (on the Bench and southern part of the Sand Plain) which is suitable for urban and industrial development. Most of this land falls in Classes 5 and 6. Classes 7 and 8, owing to very poor drainage or excessively steep slopes, are not suitable for any development. While Classes 5 and 6 soils are not serviced directly by the Queen Elizabeth Way they are served by the Canadian National Railway and number 8 highway. Urban and industrial development can be guided to the Class 5 and 6 soils. This would take the pressure off, and in effect, would preserve the Classes 1 to 4 soils for horticultural purposes.

Obviously for various reasons, the application of this plan will not be a simple matter. But planning *on the basis of land quality* seems to be the most logical method of achieving a compatible integration of urban and agricultural land uses in this or any other area in Ontario.

The Big Rain

GERALD A. SIMPSON

ON JUNE 16 AND 17, 1957, a ten-county area in Southwestern Minnesota was hit by a rain the likes of which local residents had never seen. Between late afternoon of June 16 to the early hours of the 17th from five to eight inches of rain fell. In some places it reached ten inches and some unofficial measurements were as high as 12 inches.

The year that has elapsed since then has given the local people and technicians much time to evaluate what happened. This is the story of what has come to be known as "The Big Rain", told from the viewpoint of the soil conservationist.

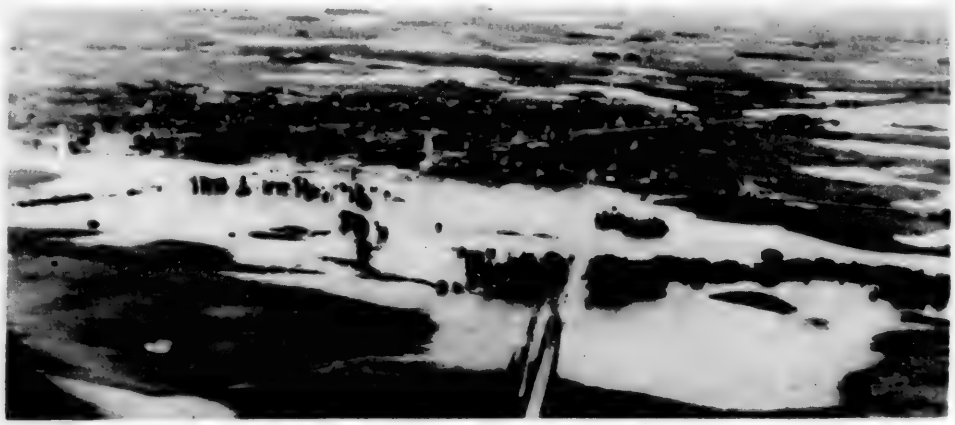

Figure 1. Adequate conservation land treatment practices and well-designed and proper watershed structures do help in reducing erosion, silt and flood-damages even when a watershed experiences a 10 to 12 inch "cloudburst."

Rainstorms of cloudburst proportions and the resulting floods and damage to crops and property make news for a few days or weeks. Eventually communities experiencing these disasters settle back to normal, and life continues in its routine way. Occasionally, we see communities stirred to the point where they organize and carry out watershed action.

To the professional conservationist the big storms serve as a "proving ground" for observing the effectiveness of land and water practices he is helping soil conservation district cooperators apply to the land. They let him check the functioning of practices under field conditions and subject to very severe trials. Such testing points out where designs are adequate and the weaknesses that need to be corrected.

The big storms also afford the conservationist an opportunity to obtain dramatic photographs and colored slides of damage and comparisons of the effectiveness of practices and installations. The big storms furnish soil conservation district boards of supervisors an opportunity to hold tours on the ground and in the air to impress people with the importance of land treatment. And they afford the conservationist and local people an opportunity to observe runoff, effectiveness of lakes and sloughs in temporary storage, and to collect damage figures. Such information will help later in planning or extending watershed programs.

Gerald A. Simpson is area conservationist, SCS, located at Marshall, Minnesota.

During the afternoon of June 16 and the early hours of June 17, 1957, a storm front traveled in a northeasterly direction from Sioux Falls, South Dakota, via Pipestone, Marshall, and Montevideo, Minnesota, finally exhausting its heavy precipitation at Willmar, Minnesota. Official and unofficial records show 3.17 inches at Luverne, 4.90 inches at Hardwick, 6.18 inches at Pipestone, 8.97 inches at Marshall, 11.0 inches at Clarkfield, 10.0 inches at Ivanhoe, and 10.0 inches at Montevideo. Agricultural Research Service gages on the Vern Long farm five miles north of Pipestone recorded ten inches; on the Norman Berger farm two miles south of Lake Benton 12 inches, and on the Elmer Furgeson farm 12 miles west of Marshall 12.6 inches. These and other farm gages

established that a large portion of southwestern Minnesota had an eight to 12 inch storm.

At Marshall, rain began falling at 2:00 o'clock the afternoon of the 16th and continued steadily until 5:00 a.m. on the 17th. It was the largest storm ever recorded in the area. The intensity was so great that it would not normally be expected to occur more than once in 100 to 500 years. This will long be known locally as the "Big Rain."

The storm covered the entire watershed of the Redwood and Yellow Medicine Rivers and portions of other streams causing several days of flooding. Marshall, Minnesota, was the center of national news for several days. Pictures of its flooded streets appeared on front pages all over the nation. Disaster agencies officially reported $17 million crop, property, and flood-damage loss in the ten-county area.

Figure 2. Strict attention must be paid to relatively flat waterways. Failure to seed waterways along such slopes to grass can result in costly damage to the field and others below it.

In addition to flood damage, two and one-half million acres of cropland were badly eroded. No one will ever know exactly the tons of soil moved or the resulting reduction in potential crop production. No one can put precise cost figures on these losses.

Corn and soybeans make up 50 to 60 per cent of the crops grown in the area. On June 16, these crops were four to six inches high. They were being cultivated for the first time. At this stage, they do not protect well the soil from beating of rain and surface flow. Oats and barley were ten to 12 inches high and did protect the soil to a considerable extent. Hay was almost ready for first cutting. Bromegrass was headed out.

As soon as personnel of the Soil Conservation Service could be released from civilian defense activities, they began checking the farms of cooperators to learn as much as possible of nature's "proving ground". This included the local work unit conservationists as well as key people from the state headquarters of the Service.

Howard Stevermer, WUC from Ivanhoe, Roy Bennett, state staff soil conservationist, and John Maher, engineer, beat a straight line to the Blegen, Hollander, Cyriacks, and Kerr farms two miles south of Lake Benton. These farms were the site of the 1954 State Conservation Field Day (Plowville), and were in the heart of the heaviest rain belt. Rain gages showed that 12 inches had fallen in 15 hours. Terraces, strip cropping, waterways, contouring, tile drainage, and other practices had been applied here during the field days.

On the morning of the 17th, Ralph Lowery, Lyon County work unit conservationist, took a boat to the Marshall Airport and after a three-hour wait, sufficient landing strip had reappeared to permit an airplane to take off. Ralph succeeded in getting a number of good

Figure 3. Barnes silty clay loam soil, 10 per cent slope, 150 foot average length of slope, and row-corn planted up and down hill spells E-R-O-S-I-O-N when hit by a 12 inch rainfall . . . soil losses 25 to 40 tons per acre.

Figure 4. On a neighboring farm with similar soil, slope, and length of slope, the crops were in contour strips. Small rills were noted in corn strips, but there were no gullies and fans. Soil loss was estimated to be 10 tons per acre.

colored slides and a few black and white photographs. He recorded the rise of flood water, its disappearance, and the damaged land and waterways.

Soil scientists, Hilding Hokanson and Donald DeMartelaere of Marshall, hiked over a number of fields measuring the rills and fans. Other conservationists similarly checked their respective districts in the ten-county area within the next few days. Most of the findings were not surprising—we knew about what to expect. Actually what we saw reaffirmed what was already known about the effects of such severe runoff on clean tilled crops. But in this case we were looking at actual fields and not at some run-off plot on an experiment station with everything under control.

We tried the best we knew to measure the amounts of soil loss without having had the benefit of measuring gages and collection tanks. Knowing what we did about soil losses as measured at the various soil conservation experiment stations under different crop and soil conditions we were able to estimate what we saw. But at the same time, we had no actual and precise measurements.

From past experiences in observing what had happened on runoff plots, we decided that where the soil was pounded smooth from the beating rain but showed no evidence of rilling we could count on a soil loss of from four to ten tons per acre. If small rills one to two inches deep appeared the loss-removal was ten to 15 tons per acre. When deep, large rills and shallow gullies and fans appeared, the loss ranged from 25 to 40 tons per acre. Even if these assumptions are not necessarily accurate measuring sticks, they do give relative comparisons of the effectiveness of practices. All the estimates of losses are from lands in corn or soybean crops.

These are our findings following the "Big Rain":

1. Land that had a high proportion of grass and legume stood up surprisingly well compared to land intensively farmed to row crops. We had no way of getting a quick measured comparison other than visual observation. The soil that was in poor physical condition was beaten smooth except for the rills. Sand grains were detached ready to be moved by the wind. Colored slides taken from the air, showed the dark organic matter accumulated in the draws and potholes. On the other hand, soils in good physical condition maintained some structural roughness and cohesion of soil particles.

2. There was about one-third as much erosion on grain fields or strips as on adjacent lands in row crop. As usual, no erosion was evident in hay land.

3. Hokanson and DeMartelaere inspected a typical 30-acres watershed midway betwen Ivanhoe and Marshall. The area had a 12 inch rain. The soils were Barnes silty clay loam and Barnes-Buse complex on an average of ten per cent slope and with Flom and Parnell silty clay loams in the waterways. The corn was planted up and down the hill without regard to the contour. The rills were three to six inches deep, 18 inches wide, and occurred in every other interval between rows, probably influenced by track impactions left when cultivating. There were five fans of soil deposited at the foot of slopes. By measuring the area and depth of each fan, it was determined that 22,275 cubic feet of soil had been deposited. This represents 26.5 tons per acre loss for this watershed. There was no way to know how much more soil was carried off by the racing water.

4. Terraced land averaged from five to seven tons per acre loss and gave excellent water

Figure 5. On a contour field the turn-rows planted to corn up-and-down hill simply will not hold back soil losses which amounted to 20 to 30 tons per acre. Grassed turn-rows would have helped.

Figure 6. Adjacent to the turn-rows shown in Fig. 5 was row-corn on the contour. Soil losses were here estimated to be 10 to 15 tons per acre . . . a considerable saving.

Figure 7. WUC L. Swanson in the channel of a diversion terrace. This farm used a "one-third" strip crop system. Rilling was reduced for the first 200 feet below the top terrace; an additional terrace within 100 feet of the top of the slope would have reduced washing considerably.

erosion control. Both graded and level terraces over-topped with little or no damage. Very little repair maintenance was required.

5. Contoured strip-cropped land averaged ten to 15 tons per acre loss on the corn strips with small rills about every 50 feet across the slope. Grass strips below the row crop filtered out the soil in the top two feet of the strip. In addition, there was no wind erosion problem following the rain.

6. Strip cropping with every third strip in meadow is frequently used on six per cent and flatter slopes. There was more erosion on these one-third sod systems than on those with one-half meadow in spite of being on flatter slopes. (Soil Conservation Service technicians are beginning to combine diversion terraces with contour strips to control the length of slope.) On Barnes silty clay-loam soils, where slope length was held to 150 feet by a diversion terrace, the one-third sod system was just as effective in control as terraced land. The northern portion of Pipestone County had ten inches of rain. Moody silty clay loam soils on three to four per cent slope and of 400 to 700 foot lengths occur here. Judging from the effects of the "Big Rain", it would appear that the top diversion should be within 150 feet of the top of the slope. We learned also, that it is especially important to level out old dead furrows and gullies above diversions and terraces to stop any concentration of water and silt into the channels.

7. Contouring alone (without terraces or strips) is usually limited to shorter slopes. Soil losses on contoured crops were estimated to be 15 to 20 tons per acre. Rills were frequent except on the fields that had been in a meadow crop the preceding year.

Figure 8. Walter Cyriacks' farm near Lake Benton had been the scene of "Plowville" conservation field day in 1954. Here terraces gave excellent protection to soil and crops during the Big Rain. And the downpour of Big Rain in-soaked where it fell.

8. Bromegrass waterways did a perfect job. The grass was at its optimum stage of growth to protect the soil. We have not observed a single failure on a well established waterway. On the other hand, there were many silt fans deposited on top of good waterways where adjoining slopes were not protected with either terraces or strip cropping. The waterways covered by these silt fans will have to be reshaped and re-established.

9. Farm ponds and earth-filled structures stood up without failure or noticeable damage. There were about 100 ponds in the storm area. Two ponds had been completed on Friday before the "Big Rain" and filled sometime Sunday night during the storm. On at least 15 ponds, both the mechanical and emergency outlets were over-topped with a flow of three or four inches deep going over the fills without damage. In every case, the fills had been well compacted when constructed. We learned here that persons supervising the construction of earth fills must allow plenty of extra height for settling of the new fill. Some contractors tend to make the top of the dam level instead of hump-backed as needed. At least two mechanical structures with eight-inch pipe risers were completely plugged with bits of old straw that had floated in. This emphasizes the importance of checking every structure [during or] immediately following a storm.

10. A few tile drainage systems with good surface drainage and without too much watershed above them worked perfectly. The storms far exceeded the designed capacity of the tile systems. Most of them couldn't remove the water fast enough to save the crops. Pump outlets were ineffective.

11. Strange as it may seem, within 24 hours after the biggest rain in local history, the control of wind erosion suddenly became very important. On Tuesday the 18th, a light wind of 15 to 20 miles per hour started soil blowing on the high ground except that which was in a strip crop system. This necessitated immediate strip-cultivation between potholes and draws to check the blowing. Fortunately, the wind did not become stronger or continue beyond this one day.

The experience of the "Big Rain" strengthens the soil conservationist's convictions that he must do a good technical job. It confirms his belief in the importance of the soil and water conservation practices to protect the nation's croplands. The slides taken during and after the "big rain" have been used at dozens of meetings. At least a thousand people have participated in district air tours to study the problems. If all people could see the urgency for action as clearly as the soil conservationists, land treatment and the necessary structures for watershed protection would soon be planned and applied.

Soil Relationship in the Oklahoma-Kansas Anthrax Outbreak of 1957

G. B. VAN NESS

IN THE SPRING OF 1957, Eastern Oklahoma and Kansas had a series of rainstorms which caused serious flooding throughout the area. One of the centers of prolonged rainfall was in Craig County, where 35 inches of rain fell through April, May, and June. (This was reported by Ray Walker in the JOURNAL OF SOIL AND WATER CONSERVATION, September, 1958.) Following the rains, a prolonged drought with hot weather culminated in an outbreak of anthrax in livestock which may well become a classic in disease control. This outbreak raises some questions in soil and water conservation and management, which, while not new, are pressing for answers.

Anthrax in livestock is due to a soil-borne, pathogenic, aerobic spore-forming organism. This organism, *Bacillus anthracis*, did not appear in North America until the Europeans arrived with their horses and cattle. One explanation for the late arrival may be the difficulty of spore formations at temperatures below 60° F., an important factor in limiting its distribution by way of the Bering Strait land bridge. It is a common problem in the Louisiana-Texas coastal and delta areas.

The eastern Oklahoma-Kansas area was a trail route for cattle drives avoiding the Ozark Uplift, and from 1873, Vinita, Oklahoma has been a shipping point for southern cattle. Anthrax is not new to the area, but an epizootic of the 1957 variety has not previously been reported. Interestingly enough, the infection was also a problem in 1951, when there occurred a similar weather pattern of less magnitude.

Although anthrax is thought of as a "bottom land disease," and flooded stream valleys were common in the area in the Oklahoma-Kansas outbreak, the first losses were on high ground in north central Craig County. A second concentration of infection then developed in southern Craig County, and at the same time to the northward in Kansas. Superficially, it might appear that the disease was spread by water draining from high ground, but carefully developed studies pointed to the probability that the outbreaks "developed" on each of the infected premises. "Spread" was purposefully dropped from conversation.

Why anthrax appeared on so many different premises during the outbreak can possibly be attributed to the subdivision of a former range area into small farms. Early in the outbreak, it was observed that shale soils were notably free of cases. Limestone soils and organized alluvial soils, particularly of the Parsons series, were commonly involved. Water damaged vegetation was observed on each of the premises reporting losses from anthrax.

Further search indicated that at the termination of the rains in early July, ground water flowing from the subsoil had continued to introduce alkaline salts into the environment of decaying vegetation. At the termination of this flow, the whole area dried out under the influence of hot, dry weather. These conditions are favorable for a preponderance of aerobic spore-forming organisms, which can take advantage of the night moisture for growth, and can resist the drying sun during the day.

Four general environmental conditions were observed to be associated with the anthrax outbreaks. The first factor noted was water damaged vegetation on the banks of ponds, to which livestock had free access. The ponds in the area were notably shallow, and for several years were often dry. Cattle had free access to all portions of these ponds, a noticeably objectionable practice from the infectious disease standpoint. Large areas of dusty dead grasses were present from the water's edge to the high water level of the pond. In this grass, the aerobic spore-forming organisms find favorable conditions. As further study of anthrax and related geovitic diseases progresses to conclusions, elimination of these environmental conditions may become disease control procedures, as well as good agricultural practices.

Figure 1. A normally dry water course showing the effects of prolonged run-off in an area of high anthrax losses.

G. B. Van Ness, Laboratory Services, Animal Disease Eradication Division (USDA, ARS), Washington 25, D. C.

In a letter, accompanying the article, Dr. Van Ness stated that "the 1958 experience with anthrax substantiated our 1957 studies, and I feel that soil management has now assumed a major role in the factors associated with anthrax outbreaks."

Figure 2. Dead grass and trash along the edge of a pond. Three of eight cattle which had access to this area died of anthrax.

A variety of bottomland anthrax was encountered when a persistent high water table caused damage to grasses on level ground. This differs little from flooding, and the effects were much the same. Damaged and dead vegetation was encountered throughout the areas where a prolonged high water table had occurred. Very few of the outbreaks were associated with the Neosho River bottom lands, but one serious outbreak was studied. On this location, the grasses were replaced by water-resistant weeds. The stream valleys had some cases, but it was difficult to differentiate between the effects of flood or a persistent high water table.

Although anthrax may be thought of most commonly associated with silt and alluvial soils, losses in an environment associated with limerock and moss-covered stream beds presents an interesting contrast. The rocks of the streams in the limerock areas were covered with dried debris and silt from prolonged water flow. Whether this material on drying offers an opportunity for anthrax propagation requires further study. Centers of anthrax near Pryor, Oklahoma and Mound Valley, Kansas were of this type, and this environment was later encountered in California and South Dakota. It represents a departure from the usual thinking regarding anthrax endemic areas.

The anthrax outbreak was on the fringe of the Tri-State Mining Area. Mineral and coal mining is important to the area, and a by-product, ground limestone "chat" has had wide use as a road building material. The level prairie soils have under cultivation lost their alkalinity, but liming and the presence of road chat near some outbreaks was a more logical explanation for the production of favorable anthrax environments. It is significant that water courses were always present, so that the practice of liming soils suitable for cultivation is not suspected. Anthrax, as a remote possibility, may find a favorable environment on poorly terraced and limed pastures if the infection ever is established there.

The four environments had in common soil saturation and damage to vegetation incidental to prolonged rainfall. In the years preceding the outbreak rainfall had been deficient, increasing the potential surface alkalies by evaporation. A source of alkalies was evident in all outbreaks observed, and the disease was not seen on the shale soils nor on the well-drained sandy loam soils. As the result of these observations, it is obvious that the soil scientists will be concerned with future outbreaks of anthrax. It is even conceivable that a special field of study embracing the relationship of agricultural practices, soils and infectious diseases may be necessary to reduce the problems associated with geophytic infectious diseases.

Figure 3. Mining area from which lime-bearing "chat" is taken for road and railroad construction. The influence of this source of alkali was noted in numerous isolated outbreaks of anthrax.

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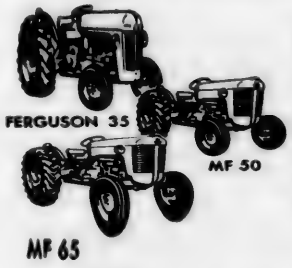

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Benton County (Oregon) Conservation Week

HENRY PAVELEK

Henry Pavelek is Area Conservationist with the Soil Conservation Service, Albany, Oregon. Here Pavelek has written a "how-to-do-it," with emphasis on a conservation week.

WHEN OREGON'S governor, Robert D. Holmes, proclaimed Conservation Week May 11-18, 1958, he spotlighted wise use of natural resources, and touched off one of the state's most successful volunteer "selling jobs."

Oregonians listened to the story of their soil, water, forest and wildlife resources many times over the years. But it took dedicated committees of "resource salesmen" to talk up conservation needs and convince city, urban and farm people that they should get on with the job.

Conservation week was a state-wide observance in Oregon with some 36 county committees and dozens of volunteer workers joining forces to plan week-long programs covering the broad field of conservation.

The Oregon State Committee on Natural Resources led the Week's festivities and Governor Holmes named individual county leaders.

The effective all-out way Benton county people organized their part in the observance, is an example of the careful planning that went into the programs carried out by all counties.

Benton county's Conservation Week Committee was a cross-section of many conservation interests. It was a team job with businessman Henry Kaiser, chairman; Henry Pavelek, Soil Conservation Service, vice-chairman; S. A. Jackson and Martin V. Thingvolk, county extension agents, and Virgil Lance, SCS, working problems out side by side. The committee got a lot of good help from Benton County Soil Conservation District supervisors.

At its first session, the committee looked for ways of arousing public enthusiasm for the Week, obtain general participation of local people and avoid over-lapping in programming.

These objectives Chairman Kaiser feels were accomplished by featuring six different conservation themes during the Week—Soil Stewardship, Education, Forestry, Soils, Wildlife and Water—one each day.

Says Kaiser, "Setting up a new conservation program for each day of the week really boosted interest and beat plugging the same conservation theme all week.

"Committees we picked to head up each day's activities got out press and radio releases, planned things and made the program go.

"Also we set up community committees, representing various groups and organizations, who assisted with the overall Conservation Week program in their area."

Figure 1. The Governor of Oregon *(seated)* signs the proclamation for Conservation Week. Committee *(l-r)*: Virgil Lance, SCS; Cy Thompson, Benton SCD; H. J. Pavelek, SCS; S. A. Jackson, Extension Service; Henry Kaiser, chairman.

Two weeks before the kick off of the Week's program, Kaiser wrote some 79 farm, garden, civic, community and fraternal organizations in the county, suggesting that they put on Conservation Week programs. His letter included the Governor's proclamation, the Week's program, key committees, and an offer to help in program planning.

"We figured," notes Kaiser, "that if each organization read the proclamation at a meeting, it would do a lot of good. We were real pleased when we learned that most of the 79 groups put on a conservation program during May."

Benton county newspapers and radio stations gave Conservation Week the full treatment. Daily doings were reported in news and feature stories.

In an editorial, the *Corvallis Gazette Times* said, "The growing observance of National Soil Stewardship Sunday by both individuals and groups indicates not only man's feeling of kinship to the soil but also society's growing recognition of its dependence on soil and water resources."

Radio coverage included interviews on soil and water conservation work completed on the farms of Don Hector, chairman, and C. Thompson, secretary-treasurer, and Lester Powell, a supervisor of the Benton County SCD. Other Conservation Week radiocasts were made with Virgil Lance, SCS, and Virgil Childs, of the Benton county Agricultural Stabilization and Conservation Committee.

Figure 2. Cy Thompson's farm was visited during the Week. Here *(l-r)* Thompson, Kaiser, Pavelek and Lance examine drill used by Thompson for alternate-row seeding of alfalfa and grass.

The Extension Service, Benton SCD, Oregon State College and SCS conducted three well-attended tours, showing agronomy, drainage, forestry and farm pond work on farms and ranches.

"Our schools really came through and backed Conservation Week," Kaiser explains. "County superintendent, Mrs. Helen Baker, gave us fine cooperation. For one thing, she assisted us in getting out most of our printed material."

Members of Mary's Peak Chapter, Izaak Walton League, sponsored a conservation poster contest, and got 100 per cent participation from pupils by contacting grade schools in the county. Various cash awards and gift certificates were offered by sporting goods stores to winning contestants.

Contest judges were League members, Paul Goodmanson, consulting forester, Corvallis; Frank Parks, associate professor of Sociology, Oregon State College, and Virgil Lance, SCS.

OSC dean of men, Dan Poling, called attention to Conservation Week in a student assembly and the student paper, *Barometer,* carried stories on the Week's events.

The Soil Stewardship Sunday committee, working with the County Ministerial Association, and Benton SCD, secured good participation from churches. District cooperators distributed a thousand or so bulletins supplied by the National Association Soil Conservation Districts at Sunday services.

The Benton county librarian liked the Conservation Week display of a farm plan and conservation printed materials so well it was held over a second week.

Conservation Week programs won't run themselves. You've got to work and plan to make them go. In Benton county these key factors had a lot to do with making the Week a popularly-received and worthwhile undertaking: 1. leadership, 2. good working committees, 3. teamwork, 4. planning and programming, 5. activating the plan, 6. coordinating activities. It took all six of these essentials to put Conservation Week over in Benton county.

Looking back on the Week's intensive program of talks, tours, contests, displays and press and radio coverage, chairman Kaiser observes, "The Week was a salute to all those who are working for conservation goals. And it was a splendid opportunity to show our people how much conservation work needs to be done. Conservation is an around-the-year job which the activities during Conservation Week brought into sharper focus. Our committee certainly had a common ground for action. It was a team effort all the way.

"Conservation Week gave our Benton county folks a lot to think about. We believe this united front for conservation won a lot of new friends and backers for the movement."

Figure 3. Corvallis Public Library prized its Conservation Week exhibit. Ribbons lead down to colored soil and land-use capability map of the Hildebrand farm and farm plan and map. SCSA publications were also exhibited.

Conservation Goes to School at Kettle Hollow

J. A. WALKER

J. A. Walker is Area Conservationist, SCS, located at Knoxville, Tennessee. He is a member of the East Tennessee SCSA Chapter. Tennessee, through the guidance of James L. Bailey, SCSA member and Educational Supervisor, Department of Conservation, Cordell Hull Bldg., Nashville 3, Tenn., has developed a very fine method of distributing educational materials that avoids the "one-shot" approach.

"WE DECIDED what needed to be done and worked together to accomplish our goal." These were the words of Mrs. Charles Laws, principal and only teacher of Kettle Hollow, a one-room school in Union County, Tennessee. She was talking to a group of graduate students from The University of Tennessee, Department of Geography, who were attending a conservation workshop at nearby Big Ridge State Park. The group had come to observe what could be done from a conservation standpoint on what was previously an eroded gullied school ground.

"It started like this," Mrs. Laws remarked. "In August of 1956 a conservation workshop for teachers was sponsored by the Union County Soil Conservation District, the Union County Superintendent of Schools and the Tennessee Department of Conservation. As a result of attending this workshop, I became interested in trying to teach conservation by applying conservation practices to the school yard.

"James Bailey of the Tennessee Department of Conservation suggested that a plan be developed for the grounds. A visit was made to the County Courthouse where the deed to the school property was reviewed, and proper notations made in order that accurate measurements of the grounds could be made. This was valuable experience for the students.

"The Union County Soil Conservation District asked Paul Hutton, the local technician of the Soil Conservation Service, to assist the students in developing a conservation plan. The technician visited the school and talked to the children about various conservation practices. We walked over the grounds together. Erosion problems were identified and possible solutions were discussed. Together we decided what would be done.

Figure 1. Graduate students of the University of Tennessee held a workshop at Big Ridge state park. They visited nearby Kettle Hollow school to observe an excellent conservation education program.

Figure 2. A schoolyard planting of weeping lovegrass is observed by *(l-r)* Paul Hutton, SCS, James Lovell Bailey, state conservation educator, and Mrs. Charles Law, teacher at Kettle Hollow school.

"A large map of the school grounds listing conservation practices was prepared and displayed on the wall of the school room. It showed some projects the children would

undertake. One of the jobs that needed to be done and which the children could not do was the construction of a small diversion ditch to take water from a hillside away from the school building. When one of the school patrons heard that a ditch was needed, the necessary equipment was brought to the school and the job was completed. The children were able to handle most of the other jobs. By careful planning, hard work and excellent cooperation of the school families much of the school-ground program was accomplished:

"A woods border of Lespedeza bicolor, a shrub suitable for wildlife, was established. The plants were supplied by the Tennessee Game and Fish Commission. Weeping lovegrass was seeded in rows on a raw shale bank. The seeding was mulched with leaves and brush that were carried from the nearby woods by the children. Honeysuckle was established in an old gully and in a waterway. Bermuda-grass was sprigged on the school ground. A play area was developed by clearing out brush and seeding to Chewing's fescue."

The graduate students saw the plan was almost completed—the erosion had been stopped; valuable lessons in conservation had been taught. Students and teacher of Kettle Hollow used their school grounds as a laboratory for studying conservation. To all concerned, conservation became what it truly is—a live, meaningful subject.

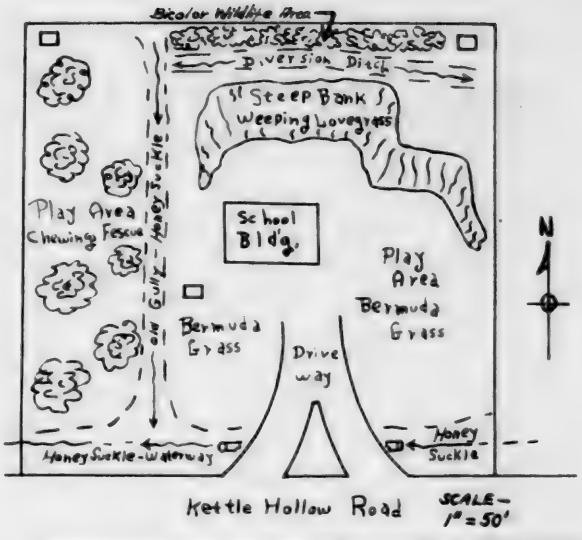


Figure 3. This map shows the school project and was used by the pupils to follow the progress of their project.

Evaporation Factor

A. L. SHARP

A. L. Sharp is Supervisory Hydrologist, Cooperative Water Yield Procedures Study, Watershed Technology Research Branch, Agricultural Research Service, Lincoln, Nebraska.

In this article, A. L. Sharp discusses "Factors Affecting Evaporation from Plants and Soils" by C. B. Tanner, JOURNAL OF SOIL AND WATER CONSERVATION, *Vol. 12(5):221-225.*

The comprehensive, lucid and well illustrated article, "Factors Affecting Evaporation from Plants and Soils," by Dr. C. B. Tanner was one of the best that has appeared in the JOURNAL. However, I believe that the emphasis that the author placed on solar radiation may be worthy of some discussion.

Evaporation of any liquid from any surface—open liquid, plants, soil, wicks, etc.—is basically one of utilization of energy. Each liquid has its own latent heat of vaporization, being about 580 calories per gram at 30° C. or 86° F. for water. This varies from about 597 at freezing to around 536 at boiling. These values, of course, are for standard conditions of pressure, temperature and pure water. At temperatures found in the field during the growing season, 80 to 100° F., nearly 580 calories of heat are required to evaporate a gram of water. It makes no difference to the water (or plant) where such heat comes from, the air, conduction, long wave radiation from black bodies, or short wave solar radiation. Any time the water gains 580 calories of heat, a gram will be vaporized providing the temperature and surrounding pressures are not raised, as in a boiler.

That climatic factor which will best estimate the net heat gain of the water will best estimate evaporation or transpiration. Some data indicate that air temperatures are better such estimators than is solar radiation. It is reasoned that temperatures better integrate, or evaluate, net heat gains by the water than does solar radiation which is, of course, the *source* of practically all our heat available at a given moment. If this were not so, then evaporation would cease at sundown or shortly thereafter (at the end of diffuse solar radiation from the sky). We know this is not true. Evaporation may slow down, but

it does not necessarily stop, at nightfall, as any housewife knows from her late wash on the line.

This line of reasoning is supported by an analysis of transpiration data secured by Dr. T. A. Kiesselbach of the Agricultural Experiment Station of Nebraska at Lincoln from 1910 to 1917. Dr. Kiesselbach grew corn in "potometers," steel cans 16 inches in diameter and 36 inches deep, holding about 250 pounds of soil. Soil in the cans was covered with three inches of gravel to reduce evaporation from the soil. The corn grew through a 4-inch hole in a loose fitting lid. As soon as the corn attained some size, a piece of oilcloth was wrapped around the stalk to cover the hole in the lid. The oilcloth was sealed to the stalks with modeling clay (plasticene). This arrangement prevented the entry of rain into the potometers. Water was added in measured amounts daily to the soil by means of an outside can connected to a coiled, perforated tube buried in the soil. Daily water losses by transpiration (largely, since evaporation was reduced by the gravel, lid and oilcloth) were determined by weighing the potometers and the water added to maintain ample soil moisture. The potometers were in pits in a small corn field to equalize as much as possible environmental conditions, avoid "clothesline effect."

Climatic factors such as air temperatures, evaporation from open water surface, percent of possible sunshine, wind velocity and relative humidity were measured during the course of the experiments. Some daily data for 1910 and 1914 were published in Research Bulletin No. 6, University of Nebraska, Agriculture Experiment Station of Nebraska, June 1915 (distributed June 20, 1916). Multiple regression analyses were made of these data as described below.

Tables 27 and 28 of this publication contain data on daily transpiration of corn in grams; evaporation from an open water surface; mean hourly temperatures; mean relative humidity; average hourly wind velocities 10 feet above ground, and per cent of possible sunshine. Per cent of possible sunshine was converted to hours of sunshine by means of tables of possible hours of sunshine at Lincoln. A linear multiple regression analysis was made of these data (the results from the two years, July 20 to August 16, 1910, and July 16 to August 15, 1914, were comined) using transpiration as the dependent variable and all the climatic factors as independent variables. Because it was thought possible there could be a trend in water use with time and growth of corn plants, a time factor was included in a first analysis. This was done by assigning No. 1 to the first day of each season and so on consecutively to the last day of each season, 28 and 30 respectively for 1910 and 1914. Time proved not to be correlated with transpiration hence was dropped from the final analysis. Also, because it was not a causal factor (although significantly correlated with transpiration) evaporation from an open water surface was also dropped.

The final results of the analysis were:

$$T = 0.031S + 0.093F^{**} - 0.020H^{**} + 0.043W^{*} - 4.827$$

where T = daily transpiration in Kg, S = hours of sunshine, F = temperature in degrees Fahrenheit, and W = average hourly wind velocity 10 feet above ground.

R^2 coefficient of determination = 0.820

R, coefficient of correlation = 0.898

$S_{1.2345}$, standard error = 0.145

Partial regression coefficients were:

$b_{21.345}$ (relative effect of sunshine) = 0.138

$b_{31.245}$ (relative effect of temperature) = 0.629

$b_{41.235}$ (relative effect of humidity) = —0.270

$b_{51.234}$ (relative effect of wind) = 0.129

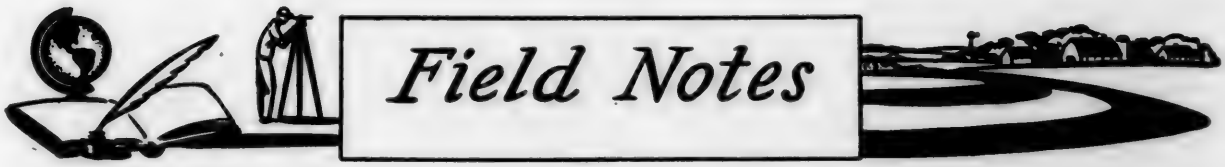
It can be seen from the above that the dominant climatic factor was temperature, with 3 to 4 times the effects of sunshine, humidity and wind. Of the several climatic factors, wind was significantly, and humidity and temperatures were highly significantly, related to transpiration. Hours of sunshine were not significantly related to transpiration.

Individual simple correlation coefficients between several variables tried in the analysis were:

	Hrs. Sunshine	Evaporation	Air Temp.	Rel. Hum.	Wind Velocity
Transpiration	.70	.75	.85	—.57	.28
Hrs. of Sunshine		.59	.60	—.62	.13
Evaporation			.66	—.63	.36
Air Temperatures				.37	.28
Relative Humidity					.17

It will be noted again that air temperatures were correlated best with transpiration. The five per cent level of significance (56 DF) is at about 0.26 and the one per cent level at 0.34.

These analyses of limited data on transpiration of corn with an adequate soil moisture supply, grown in "potometers," indicate that air temperature is by far the best index, of the several climatic factors evaluated, of transpiration. This does not seem unreasonable if it be granted that transpiration (essentially an evaporation process) is dependent on the net gain in energy (and subsequent utilization by evaporation) of the transpiring medium.



RANGE IMPROVEMENT

Man can improve on nature in wild rangelands just as he has on his more easily tamed farm land, and he must do so to meet the food demands of an increasing worldwide population, asserted R. Merton Love, professor of agronomy at the University of California at Davis.

"Range improvement suffers in comparison with other crops in three ways: In range agriculture there is a smaller degree of success in overcoming the limitations of nature, research is many years behind that for other crops, and there is too often an unwillingness among both scientists and farmers to try to do anything about it." It is urgent that the agricultural scientist participate in research on range and wildland. The emphasis must be changed from management to improvement.

Grassland, natural or artificial, is a renewable resource. Facing the researcher is the problem of developing research programs that will insure not only the continuity but also the improvement of this resource

Before full possibilities for range improvement can be realized, researchers must develop detailed information on:

- The response of range grass and legumes to environmental changes such as differences in fertility levels, clipping and grazing treatments.
- The nutrients that range species require.

With this information it should be possible to develop chemical tests for the nutrients required in different soils, so that a better grassland crop of legumes and grasses can be grown by the use of appropriate fertilizers. On range, as in field crops, better fertilization means increased forage production, longer growing periods, and improved nutritional content of food.

The introduction of better adapted grasses and legumes raises the amount and quality of forage crops, and often permits the efficient use of higher soil productivity that fertilization makes possible.

CHANGES IN THE SOUTHEAST

Southeastern farmers have seen at least five basic changes in the planning and applying of terracing systems during the past decade.

- More consideration is being given to selection of land for terracing.
- A better job is being accomplished in furnishing adequate outlets.
- More attention is being given to better terrace alignment.
- Increased consideration is being given to staking terraces to drain from the natural dividing ridge to or toward the natural drainage depression.
- The shaping of fields and the smoothing of land is receiving proper attention.

In the Southeast, one of the big jobs is tearing down the old terraces and filling in rills and small gullies. Elimination of these costly items will save the farmer money in increased farm efficiency and increased crop production. This can be done by selecting carefully the land for terracing and applying sound terracing systems. Either the parallel or conventional terraces can be used.

The purpose of parallel terraces is to obtain terrace and row alignment by having the terraces spaced an equal distance apart. To accomplish this, the following principles should be observed:

- The land should be fairly smooth and the slopes uniform.
- The natural drainage depressions in the field must be used for vegetative outlets.
- Outlets must be developed with sufficient width to include all the steeply sloping land in the depression.
- The terraces must drain from the ridge to or toward the natural drainage depression.
- Land use changes from row crops to sod crops must be made where there are abrupt slope changes in the land.
- The terrace interval or horizontal distance between any two terraces must be based on land slope and an even number of rows.

(Adapted from talk by L. D. Worley, state conservation engineer, SCS, Athens, Georgia, Dec. 17, 1958, American Society of Agricultural Engineers.)

FOREST FACTORIES FOR OXYGEN

America's forests may be important as vast "oxygen factories" to renew continuous supplies of pure air for increased human populations.

A giant layer of carbon dioxide and other contaminants is forming over parts of North America.

A recent conference of some 900 scientists called by the U. S. Public Health Service concluded that an effective weapon to fight this air pollution may be plant cover, which regenerates oxygen and absorbs carbon dioxide.

It was suggested that 10 trees be planted for every automobile exhaust to capture the deadly carbon monoxide. Evergreen forests were called for so that they may work through winter as well as summer.

Air pollution research is in its beginning stages, but already land use is involved.

PROGRESS IN WEED CONTROL

Discussions at the recent **Northeastern Weed Control Conference** included 100 reports dealing with conservation, public health, forestry, weed control along highways and public utilities and in water areas, agronomic crops, and horticultural crops. Over 600 members and guests attended the three-day conference. All of this is a far cry from pulling or chopping weeds—the procedure of yesterdays.

CREEKS ARE WORTH SAVING

Some 50,000 streams in [the United States] can be classed as creeks, according to U. S. Geological Survey estimates. Time was when you could find some fishing in most any of them. Deep pools made first-rate swimming holes and the timbered stretches along their courses furnished picnicking spots.

But the creeks aren't the same now. In thousands of instances timber has been cut away, so that the land can be plowed or pastured, and the channels, clogged with brush and eroded soil, no longer have any deep pools. The clean gravel beds, the water depths and temperatures that once made conditions livable for game fish are gone, and with them the fish.

These streams are too small to interest the lobbyists for big dams for flood control or for power or reclamation use. But the overflow damage they cause annually totals more than that of many of the headlined floods.

It may be, though, that the creeks are due for some attention. Wisconsin has a combined program for watershed improvement and a state fish policy, which directs the Wisconsin Conservation Commission "to conserve and perpetuate the fishery resources of the state for all of its citizens." With more than 8,000 miles of potential trout streams it offers plenty of opportunity for such a policy.

The program, in which all the state's conservation and farm agencies co-operate, works through local watershed organizations. It also co-operates with local civic, school and sportsmen's groups in developing nearby streams.

Protection of the waterway comes first. A protective zone along the streamside is leased from landowners for 20 years or, as often is the case, the necessary land is purchased. The protective areas are fenced and trees and shrubs planted to shade and stabilize the stream banks and furnish wildlife cover.

The program is a working demonstration of how neglected water resources can be developed for the public benefit.

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MAGPIE AND LAND-USE

The magpie, which will be seen by *SCSA* members traveling to Rapid City, has long been maligned for game bird depredations. However, research in Idaho reveals that only 1.4 per cent of the magpies examined had eaten pheasant eggs during nesting seasons. And, get this bit of land-use implication: the predation occurred principally in nests located in poor cover, indication of another reason for need of suitable or better habitat for pheasants.

"PLOW—PLANT"

Planting corn in a single operation not only saved labor and money, but produced nearly 11 bushels per acre more than the usual method, according to a research report made by Clarence Hansen, a Michigan State University agricultural engineer at East Lansing, Michigan.

Equipment designed to plow, plant, fertilize and apply pre-emergence spray for weeds in a single operation was tested on 11 Michigan farms. Yields were 10.9 bushels per acre larger than on companion plots tilled the conventional way.

Michigan State agricultural engineers compared the method with minimum tillage in 1958. Yields for both operations were about the same.

The once-over operation saves 36 per cent on fuel and 37 per cent on horsepower hours, as compared to the minimum tillage methods. Savings over conventional systems was more than 50 per cent in fuel and horsepower.

The equipment designed for the experiment was mounted on a four-wheel tractor. The method of plow-planting used in this research would save about $3 to $6 per acre.

IRRIGATION CLINIC

Wells, pumps, and land leveling, ditch lining and irrigation requirements of plants were featured at a day-long irrigation clinic held in Kingman, Arizona, on January 9, 1959.

The clinic was sponsored by the Mohave Electric Cooperative. The Co-op Manager, C. L. Kenney, explained that an efficient pumping installation and efficient use of the water by the farmer was a prime factor in insuring the economic stability of the Co-op that furnished the electricity.

Principal speakers were Harold C. Schwalen, head of the school of Agricultural Engineering, University of Arizona; Allan Halderman, Irrigation Specialist, and Lyman Amburgey, Extension Specialist in Soils of the University of Arizona Extension Service; J. J. Turner, State Engineer for the Soil Conservation Service.

Turner mentioned that the water conservation program of Arizona farmers resulted in leveling 50,000 acres and lining 500 miles of on-the-farm irrigation ditches with concrete each year.

Farmer reactions to the meeting resulted in a similar clinic being conducted in St. Johns, Arizona, and others are planned for the newer pump-irrigated areas in Arizona.

SEDIMENT IN RESERVOIRS

Better engineering design of reservoirs and lakes in Illinois is discussed in a report published by the Illinois State Water Survey, scientific research division of the state Department of Registration and Education.

The report explains an improved method of predicting sediment in reservoirs to allow location of lakes in areas where lower sediment rates occur. The useful life of a reservoir depends mainly upon how quickly it will fill with sediment.

The report culminates an eight-year study of the deep loess soils of western Illinois and is the first of a series of studies planned for the different soils in the state. Cooperating with the Water Survey in the study were the Soil Conservation Service and Agricultural Research Service and Illinois Agricultural Experiment Station.

Factors that influence how much sediment accumulates in a reservoir were found to be the gradient of streams flowing into the reservoir, the age of the reservoir, soil erosion of the drainage area, relation between the reservoir capacity and average annual inflow, density of non-incised channels and shape of watershed.

Non-incised channels, the type of drainage channel which is gently sloping and covered by some growth, were found to contribute less sediment. The study shows also that if the drainage area consists of a number of small subwatersheds draining directly into a reservoir, higher rates of sediment deposit can be expected than if there is only one large drainage channel.

Entitled "Correlation of Reservoir Sedimentation and Watershed Factors, Springfield Plain, Illinois," the report was written by J. B. Stall, engineer of the State Water Survey, and L. J. Bartelli, soil scientist for Illinois for the Soil Conservation Service. It is available without charge from the Illinois State Water Survey, Box 232, Urbana.

Both authors are *SCSA* members and active in the N. Illinois Chapter.

SEEPAGE LOSS CONTROL

Approximately one third of all the water diverted for irrigation is lost in its "travel time," according to C. W. Lauritzen, ARS project supervisor, Logan, Utah.

The water loss primarily is from seepage. The advantages of farm reservoirs for accumulating and storing irrigation water are likewise offset to a degree by similar losses. Lining of canals and reservoirs is an effective means of controlling seepage losses.

Several materials can be used effectively as linings. A new development which shows promise is a two-ply burlap asphalt lining. A feature of this lining is its low cost. The cost of the lining is conservatively estimated at less than a dollar per square yard. The actual cost of a test installation in the vicinity of Yuma, Arizona, was 72 cents per square yard. Of this amount, 20 cents was chargeable to the treated burlap, and the balance to the asphalt and labor.

Just how long these linings will last is not known. The oldest test installations are less than three years old, but the good condition of these test linings and the results of accelerated tests indicate these linings will be serviceable for a much longer time. When deterioration has set in, the lining can be resurfaced by priming the surface and adding another layer of burlap and a light coating of asphalt. It is anticipated that by such timely repairs the lining can be restored to a structure with essentially as long a service life as the original lining.

Water is one of our most valuable natural resources and the development and well being of our nation depends on a greater efficiency in the use of our water supplies. This becomes especially significant when it is recognized that more water is wasted in the process of applying water to the land than remains to be developed. Lining of canals and reservoirs offers one of the best opportunities for increasing irrigation efficiency.

BEAVER BUILT $25,000 DAM

The New Hampshire Fish and Game Department wanted to raise the water level in the upper portion of the West Peterborough Waterfowl Management area to flood many acres of dry marsh, thereby providing additional and improved habitat for waterfowl.

Engineers estimated that the project would require a dam costing somewhere in the vicinity of $25,000. Help came from an unexpected source. Beaver moved and built the dam, at no expense to the state! Department biologists refer to this beaver colony as their "$25,000 beaver".

In another part of the country, on the famed Coon Creek Watershed in Wisconsin it seems that beavers got the jump on an application for a watershed flood control program that had been sitting in Washington. Before the project work plans were approved, beavers had built four dams.

"MAN IS LEARNING!"

REPORT ON THE 1958 IUC ASSEMBLY

More than 300 delegates and observers from 45 countries representing all continents met in Athens, Greece, in mid-September, 1958, to attend the Sixth General Assembly of the International Union for Conservation. The theme of the meeting was soil and water conservation, with experts from all over the world contributing to the discussions.

There were major sessions on the use of vegetation for erosion control, effects of dams on habitat and landscape, rates of run-off and erosion, influence of soil and water conservation on natural aquatic resources, and landscape management on an ecological basis. There were also short symposia on conservation education, the effects of erosion on the decline of civilizations, and rare plants and animals of the Mediterranean region. Following the sessions there were several extended excursions to various parts of Greece that provided participants an opportunity to observe land conditions in the field.

Some 200 papers were prepared for the Assembly, 30 of them contributed by U. S. authors. The papers will appear in the printed Proceedings of the conference early in 1959. Among the fifteen U. S. representatives at the meeting were H. H. Bennett, C. L. Wirth, Luna B. Leopold, Ernest Swift, Lloyd W. Swift, Harold J. Coolidge, and Edward H. Graham. Coolidge was elected a Vice President of the Union and Graham was elected a member of the Executive Board and Chairman of the Union's Commission on Ecology. Both sides of the Iron Curtain were in attendance at Athens, with delegations from the USSR, Bulgaria, Poland, Czechoslovakia, and Yugoslavia. The next General Assembly will be held in July, 1960, in Warsaw, Poland.

The new President of the Union is J. G. Baer, of Switzerland, while M. C. Bloemers of the Netherlands takes over as the new Secretary-General. In addition to Coolidge from the U. S., other Vice Presidents are V. Van Straelen of Belgium and The Lord Hurcomb of the United Kingdom. There is an Executive Board of a dozen members from widely scattered countries. The Union functions through a central office at Brussels, Belgium, where the Secretary-General and a small staff provide a permanent Secretariat. Commissions on Ecology, Education, Parks, and Rare Animals provide specialized assistance to the Secretariat. The Ecology Commission has included a special Committee on Landscape Planning, which deals with urban and regional development from an ecological standpoint. The chairman of the Committee is R. J. Benthem of the Netherlands. At Athens there was established within the Ecology Commission a Committee on Soil and Water Conservation to be chairmanned by O. M. McConkey, of Canada. The formation of this Committee had been urged by the Soil Conservation Society of America through its Committee on International Relations

Although not a member of the United Nations, the IUC enjoys consultative status and maintains close liaison with FAO, UNESCO, and ECOSOC, all UN agencies concerned in some degre with conservation, although their primary responsibilities rest respectively with food and agriculture, education, and economic and social affairs. The IUC is financially supported by member governments that contribute according to population, and by member organizations, and grants and donations from private and foundation sources. Twelve governments are members of the Union: Denmark, Germany, Netherlands, Belgium, Monaco, Morocco, Venezuela, Tunisia, Sudan, Cambodia, Luxemburg, and Switzerland. More than 200 national and international organizations are contributing members, including the Soil Conservation Society of America and some twenty other conservation groups in the United States.

The International Union for Conservation publishes a bi-monthly news bulletin, both in French and English, the official languages of the Union. It has prepared or edited several exhibits, film strips, bulletins and books on conservation, in addition to the Proceedings of the biannual Assemblies, and is currently engaged in preparing conservation materials for secondary education in the less developed countries. An excellent conservation primer in Arabic has just been issued for use in the Middle East. The Union is custodian of the sizeable Tienhoven library, housed at the Brussels headquarters. This collection is serving as the foundation for a growing international conservation library. The Secretariat and Commissions are called upon continuously for counsel regarding conservation programs and developments throughout the world, a service that is limited by the small staff and facilities available to meet such increasing requests for assistance. It has aided in sponsoring a conservation camp for youths held each summer in some European location.

The IUC is the only international organization devoted solely to conservation. Acknowledging a broad concept of conservation, the Union is concerned with natural resources not only as a basis for the production of useful commodities, but as a source of recreational and aesthetic values as well. It occupies a unique place in the modern world, and is concerned with a phase of human activities which will demand far more attention in the immediate future than it has received in the past.

Those who attended the Athens Assembly had an unusual and rewarding opportunity not only to visit the site of one of the world's great centers of ancient civilization—now a bustling modern metropolis—but to exchange views and experiences with conservationists from many parts of the globe—all dedicated to a better understanding of the world's natural resources and how they can best serve mankind in perpetuity.

WILD LANDS RESEARCH CENTER

Establishment of a *Wild Lands Research Center* in the University of California's statewide Agricultural Experiment Station was announced recently by University President Robert G. Sproul.

Planned as the headquarters for a wide array of University research projects, the new Center will help focus more attention from science upon the problems of California's "big back yard"—the 65 million acres of resource-rich wild lands that make up almost two-thirds of the state's land area.

Appointed to direct the Center is Henry J. Vaux, Dean of the University's School of Forestry at Berkeley. The new program will also be guided by a Coordinating Committee headed by Paul F. Sharp, Director of the Agricultural Experiment Station, with other members representing University departments engaged in wild lands research. The main objective of the new Center will be to coordinate, stimulate, and assist University departments in their research on all types of wild lands problems.

Future plans also call for the organization of a Wild Lands Advisory Council made up of citizen leaders from such fields as timber, range livestock, water resources, and outdoor recreation.

The Center will promote cooperative research with institutions in other states and with agencies of the state and federal governments; will organize conferences for discussion of special problems by wild lands owners and operators, government leaders, and scientists; and will also serve as a clearing house for wild lands research information and technical information and technical data.

California's wild lands—chiefly covered with trees, shrubs, or native grasses—include forests, grazing lands, brush lands, watershed areas, and high mountains. This vast region is divided about equally between federal and private ownership.

Because of California's explosive population trends, the importance of these lands is growing rapidly and their problems are becoming increasingly serious. From wild areas comes most of the state's precious water. Farming is being pushed back to lands that were recently empty. A rapidly increasing number of sportsmen and other vacationers seek elbow room in the forests. Valuable resources must be protected against fire, insects and diseases. Management practices in forests and range lands need to be intensified. Wilderness and natural areas need to be studied and their roles in science, education and recreation evaluated.

The University's new Wild Lands Research Center will direct scientific investigation into these and many related problems.

REPORT FROM DENMARK

THE DANISH HEATH SOCIETY means to Denmark what the Soil Conservation Service and the Forest Service combined are to the United States. Just as Hugh Bennett and Gifford Pinchot pioneered in our country, Enrico Mylis Dalgas pioneered here in Denmark.

For several weeks, I have been learning by seeing, that we, in the United States, are far behind the Scandinavian countries in regard to the conservation of natural resources and of safe land use. We may be talking more, but they have accomplished more. And, besides, their people *live* conservation.

Many conservation activities center around the Danish Heath Society, which was founded by Enrico Dalgas in 1866 with the primary objectives of afforestation and cultivation of the heath which then covered nearly half of Jutland. With the passing of 92 years, its objectives have broadened until today they include most of the goals of both the Forest Service and the Soil Conservation Service. They even include some of the aspects of work done by the National Park Service, the Bureau of Reclamation, the Farm Credit Administration and the Farmer's Home Administration. There is, however, one fundamental difference. Throughout its 92 years, the Heath Society has always been a voluntary association of Danish people, even though since 1880 it has had some assistance from the government. Civic organizations, leading citizens (both rural and urban) and also ordinary people like you and me, make up its membership of 20,000.

The nearest I can come to describing an imaginary counterpart in the United States would be combining the National Association of Soil Conservation Districts, Friends of the Land and the American Forestry Association into a single promotional agency and with the Soil Conservation Service and the Forest Service combined into one action agency to get an equivalent amount of work done.

More specifically, the Health Society works for the better land use [soil improvement, crop rotations, soil drainage, irrigation, liming, tree nurseries, deep plowing to bury sand drifts and to destroy hardpan, windbreaks, planted forests, research for better answers to today's problems and better control of the coastal dunes]. It works for and promotes just about everything that is for the good of the nation, rural and urban interests both considered.

* * *

One hundred years ago Jutland was quite different than it is today. Settlements and farms had developed along and near its coastlines, water courses and lake shores, but most of the interior consisted of treeless, barren-looking heath. This vast area of heath (approximately half of Jutland) lay quite vacant, usually unused and unwanted. This level to greatly undulating —and occasionally hilly—terrain is monotonously bare of any upstanding plants. They usually rise from 6 to 8 inches above the earth. Today, however, scattered individual Mountain pines *(Pinus Mugo)* have become established on the heath and may mark a step in plant succession, from heath to forest.

Another feature, the prehistoric mounds of the Bronze Age (around 3000 years ago) and less frequently of the Stone Age (around 5000 years), also breaks the otherwise smooth skyline. They are 15 to 25 feet high, with several to many visible at almost any moment. They are *all* on the hilltops or ridgetops. These mounds are controlled by the National Museum, and any person mutilating them is subject to a heavy fine. The farmer having one or more in his field is not permitted to cultivate them, although his stock can graze the grass cover to a moderate degree.

The heath, as referred to above, is very much like the Scottish moors and quite similar to the Alaska tundra which I have studied and consists entirely of low-growing, almost prostrate plants.

Although the heath is a lonesome-looking landscape—especially in the typically, cloudy and foggy atmosphere—its detailed make-up is truly lovely at all times.

* * *

We have recently been guests of the Danish Heath Society at one of their most interesting projects, the Kongenshus Memorial Park. The Society's editor, Harald Skodshoj (pronounced Skōshoy) was our genial fountain of information. The park is a 3000-acre area of virgin heath which they have reserved for the coming generation to know and enjoy. Although nearly half of Jutland's 6 or 7 million acres was heath in 1850, the area of potentially arable heath is today approaching the point of disappearance, so this park will insure that future generations can know what much of Jutland was just 100 years ago.

The outstanding feature of this park at present consists of many mammoth glacial boulders of granite and quartzite, placed upright along an avenue to honor the now deceased conservation leaders from every part of Jutland. Their names are deeply chiseled into these standing monuments for all people to see and revere. It is to me the most impressive and meaningful memorial I have ever seen. It is simple and plain, is completely encircled by the heath, but, oh, how effective.

* * *

The Danish Heath Society has its headquarters at Viborg, with subordinate offices through the rest of Denmark. It has 114 employees at Viborg, and 400 in all. Its activities are many but here is one example. In 1954, the Society spent about 25 million dollars making soil amendments of one kind or another on about 260,000 acres. They were reimbursed in large measure by the landowners, but the main point is that the work was done by the Society.

In the U. S. A., the U. S. Department of Agriculture is the work agency, while the interested Societies voice either approbation or disapproval. Here the Danish Heath Society is the important unit, furnishing the ideas, the planning, the promoting and the doing. The people are really doing the job here.

In 1940, Ruth Bryan Owen Rhode, who had then been our official representative to Denmark for 15 years, told me that she really loved Denmark and its people. Last week, Val Peterson, our present Ambassador to Denmark, told me very nearly the same thing. And, after only a few weeks here, we have begun to understand why nearly everyone loves this country and its people. *"As Viewed by* W. A. ROCKIE."

(L-R: M. K. Goddard, R. Davies, and A. H. Veazey.)

ROSS DAVIES, SOUTH DAKOTA STATE CONSERVATIONIST, EXPOUNDS "FRONTIER ECONOMICS" IN ADVERTISING THE SCSA 1959 ANNUAL CONVENTION (RAPID CITY, S. D., AUGUST 26-28). HE PASSES OFF "WOODEN DOLLARS" ON A. H. VEAZEY OF NORTH CAROLINA AND MAURICE K. GODDARD OF PENNSYLVANIA, KEYNOTE SPEAKER AT THE 1958 CONVENTION. "WOODEN DOLLAR" HOLDERS GET FULL VALUE ON REDEMPTION

MAN'S ROLE IN CHANGING THE FACE OF THE EARTH. *An International Symposium under the co-chairmanship of* CARL O. SAUER, MARSTON BATES, LEWIS MUMFORD. *Edited by* WILLIAM L. THOMAS, JR. *Chicago: published for the Wenner-Gren Foundation for Anthropological Research and the National Science Foundation by The University of Chicago Press, 5750 Ellis Avenue, Chicago 27, Illinois. 1956. xxxviii + 1193 pp. (7 x 9¾ in.), 180 illus., 33 tables, index. $12.50. (Reviewed by* LOWELL SUMNER, *San Francisco, California.)*

In June, 1955, seventy distinguished authorities from the United States and six foreign countries gathered at the Princeton Inn, Princeton, New Jersey, under the sponsorship of the Wenner-Gren Foundation for Anthropological Research, to discuss and eventually to record in the permanent form represented by this book, the history and future implications of the profound and ever-increasing changes being wrought by man upon the land, the sea, and in the air.

In advance of the Symposium, 53 background papers on suggested topics had been requested of the participants, with wide latitude allowed in the presentation of each subject. These papers comprise a major portion of the present book; however, they functioned during the sessions primarily as starting points for informal discussions among the assembled authorities in the varied fields of learning.

These discussions also are included in the book and extend its significance beyond the confines of exposition. They represent the pooling and interaction of minds whose diverse backgrounds include those of sociology, land-use planning, demography, geography, agriculture, anthropology, ethnology, geology, biology, paleontology, economics, political science, history, botany, genetics, philosophy, hydrology, climatology, ecology, ichthyology, oceanography, meteorology, atmospheric physics and chemistry, petroleum engineering, geomorphology, soils research, sanitary engineering, public health, medicine, mining, natural-resource conservation, electronics, geochemistry, and atomic energy.

The result is a far-ranging encyclopedia of human ecology. It is divided into three main parts.

Part I, Retrospect, traces in 22 chapters the history of man's activities and their interaction with earth forces, from the discovery of fire, the first great force employed by man, through the removal of the vast forest that once clothed Europe, and on to the intensive urbanization that marked the rise of the Industrial Age. This review of the past reveals the first outlines of man's ultimate role as a major ecologic and geologic force.

Part II, Process, ushers in the present as its 26 chapters describe in detail the profound effects of ever-expanding world populations and their industrial technologies on the world's grasslands, coastlines, the quality of ground and surface waters, mineral deposits, soil erosion and soil chemistry, forests, and the world distribution of plants, animals, and diseases. Additionally there are three chapters on the increasingly complex problems involved in waste disposal methods which already have changed the characteristics of most lakes and streams of inhabited regions, but which are wholly unable to take care of radioactive wastes of the atomic age.

From this notable section and the related discussion sessions there emerges a powerful overall impression that the accelerating development of industrial technology threatens to place our complex civilization increasingly out of balance with the earth's resources, and ever farther removed from the type of environment required for health of mind and body. Over a major portion of the earth's surface the present economy reflects the underlying philosophy that conversion of the world's minerals, waters, and plant and animal life into consumer goods should be governed, if at all, only by the capacity of the public to buy, and an American industrialist is quoted (p. 66) as saying that our principal problem now is to accelerate obsolescence. The Symposium concedes that as yet modern society is scarcely organized or educated to control the powers which it has received from science although already employing them on a vast scale; the prevailing land ethic based on the concept of "conquering nature" instead of adjusting to it, has been dangerously outmoded by civilization's mushrooming growth and complexity.

Also touched upon are the various population problems that have resulted from extending and improving areas for human occupancy. Though epidemic diseases have been eliminated as major causes of mortality in the more "advanced" countries, their place is being taken by the so-called "stress" diseases such as high blood pressure, heart and kidney disease, ulcers of the digestive tract, and associated endocrine breakdowns traceable to the tension associated with our crowding and with modern, highspeed living. In less "advanced" countries,

elimination of disease is bringing enormous increases in populations, raising the question whether, from the standpoint of human happiness, much has been gained by saving the great numbers of people from disease in order to let them die of starvation later (p. 828) or perish in wars fought for the possession of the world's food-producing regions and other natural resources.

Although these ideas are not new, especially to conservationists, the encyclopedic variety and worldwide completeness of their exposition here, the restrained and factual presentation, and the extensive bibliographic material supporting each chapter, combine to make the book one of the most authoritative sources for the entire field of human ecology.

Part III, Prospect, comprising seven chapters, endeavors, in the light of the past and the present, to gauge the most likely probabilities facing man in the future, and concludes (p. 968) that "the central problem for mankind . . . for the coming century . . . is the menace of world overpopulation." More specifically, "if the history of population growth among the European peoples since 1800 should repeat itself among the non-Europeans during the ensuing 150 years, the population of Africa and Asia, in 1950 numbering approximately 1,470 million, could be expected to increase to more than 5,900 million by A.D. 2100, and the total population of the world could be expected to pass 7,200 million before that time" (p. 980). Whether the world's ability to produce the bare necessities of life actually will permit such an increase is a debatable question. In any event, by comparison, the present population of the world, with all its shortages and inequities of distribution, its famines and denudation of natural resources, the mounting stress in daily living, the deadly struggles among nations, and other problems of overcrowding, totals only 2,500 million.

Those who are familiar with evaluations of man's current ecological status, and possible alternatives of the future, as outlined by Fairfield Osborn (*Our Plundered Planet*), William Vogt (*Road to Survival*), and Harrison Brown (*The Challenge of Man's Future*), will find additional corroboration in the chapters on "Limitations to Energy Use" and "Technological Denudation," as well as elsewhere throughout this book.

The seemingly inescapable conclusion resulting from the massive array of assembled facts and their authoritative and dispassionate analysis is that the future of our civilization depends on the outcome of a race between two continually accelerating processes: The denudation of the earth's raw materials and fuels, and man's ingenuity in discovering substitutes for them:

> In the absence of a world catastrophe it seems highly likely that machine civilization either will spread rapidly over the surface of the earth, eventually to become stabilized, or will prove to be but a transient "Golden Age" in human history, destined eventually to disappear, much as biological species have disappeared in the past as a result of changing environment and the diminishing availability of the substances upon which the species has fed (p. 1030).

Nevertheless it should be emphasized that the consensus of the Symposium, though exceedingly sobering, reflected more of cautious optimism than the reverse:

> The facts about our energy resources are sobering. The rapidity with which we are finding ways of spending that energy, often without realizing it, is shocking. The problems attendant on tapping unused reservoirs of energy are discouraging. Just the same, no one should say that man's standard of living is likely to toboggan for lack of energy—cheap energy. This optimism comes not from blind faith in the scientist and engineer, but instead from an infinite confidence, supported by a long record of the past, that man's ingenuity is equal to the task (p. 1021).

Eventual world-use of nuclear fission (the H-bomb in harness) and perhaps solar energy, appear as the most hopeful long range solutions, although "it is unwise to assume that the substantial limitations to energy use immediately before us will be dispelled by the development of controlled fission" (p. 1021). For the immediate future there is room, at least in the more fortunately situated countries, for much accomplishment which should interest and encourage all conservationists:

> Leisure and plenty in the next decades will expose the people of America, as never before in this industrial age, to variant ways of life. . . . There will be time for new forms of recreation, much of it outdoors, introducing many urban dwellers for the first time to the land, the mountains, and the sea. This will bring them into closer contact with nature and natural resources and will help to develop growing awareness of resource depletion. . . .
>
> We shall have to help cultivate individual awareness of the eternal importance of man's relationship to the earth and its resources; we shall have to find leadership to induce action to hold the prosperity we have. The motive cannot be material alone. We must be concerned with the future of the spirit as well as the future of the machine. It is not we but generations unborn who must concern us. What we shall need is cultivation of a new ethic in and for this age of leisure (pp. 1001-2).

Over and over the need for a new or a revived ethic for the land was stressed by Symposium participants, an ethic "to create more than we consume so that we do not ultimately come, after a few more decades, to the end of prosperity." For "it is unthinkable that as a nation we should bask idly in our new luxury of machines and leisure or that we should 'eat, drink, and be merry, for tomorrow we die,' while we leave to succeeding generations of baskers the knowledge that men are coming closer all the time to the day when they will have consumed the earth's remaining resources, made barren the land, and ended survival opportunity forever" (p. 1002).

Leaders of nations and makers of public policy everywhere might profitably ponder the conclusions that, "No man should be considered educated to meet the problems of this age without a minimum of knowledge about the earth's resource and population trends, without comprehending the relation of life to its environment and the interdependence of all matter."

Additionally, all of us are assured that "There is oppor-

tunity for all and need for all who have leisure time to give and the will to serve the land they love as active members of hundreds of educational group endeavors. For this sort of creative and satisfying pursuit there will never be too much leisure" (p. 1005).

Those for whom such an ethic finds appeal are urged to read in their entirety the chapter on "Possible Limits of Raw-Material Consumption" by Samuel H. Ordway, Jr., from which the above passages were quoted, the chapter on "Recreational Land Use" by Arthur Glikson, and the "Summary Remarks: Prospect" by Carl O. Sauer. Significant references to the development of a land ethic occur in other chapters, notably on pages 68, 397, 408, 481, 711-12, and 1086. The chapter "Man's Relation to the Earth in Its Bearing on His Aesthetic, Ethical and Legal Values" by F. S. C. Northrop also presents approximately the same ideas although in more devious language.

Unfortunately a review of the present limited scope must forego consideration of many vital and fascinating subjects contained in this volume. . . .

Carl O. Sauer's chapter, "The Agency of Man on Earth" raises searching questions as to the relationship between fallen civilizations and deteriorated lands, and applies the question to our present civilization, wherein much of what we call production is extraction, and even the so-called "renewable resources," including timber, are not being renewed.

Lewis Mumford's "The Natural History of Urbanization" shows how industrialization eliminated the natural factors originally limiting the growth of cities, and now is producing vast metropolitan areas by the obliteration of intervening farmland. In the process, streams become sewers, smog and soot choke vegetation and poison human lungs, factories, railroad yards, and airports multiply until even the adjacent lands needed for mass recreation become sterile. Then follows the mass exodus to suburbia, entailing an enormous increase in real estate development and the construction of paved highways which eat into remaining agricultural and recreational lands and eventually produce still more roads and developments for the further pursuit of the vanishing countryside. Agricultural greenbelt areas, in and around cities, to be specifically protected against invasion, are recommended as an indispensable part of city planning.

Paul B. Sears' "The Processes of Environmental Change by Man" is a classic summary of the problem of man as his own chief competitor, and his depletion of soils, forests, grasslands, waters, mineral resources, and the atmosphere. How rarely do land use planners seem aware of the point he makes that "buildings and other installations within the flood plain of a great river should be in the same category of calculated risks as vineyards on the sides of an active volcano." Instead, vast sums of public money are spent on flood control projects to protect those who trespass on lands that by the laws of nature belong to the river.

William A. Albrecht's "Physical, Chemical, and Biochemical Changes in the Soil Community" presents a wealth of highly interesting and significant information on the close relation between soil conditions and plant life, including the thesis that soil depletion by impairing the quality of man's food crops in turn is undermining human nutrition.

Edward H. Graham's instructively illustrated chapter on "The Re-creative Power of Plant Communities" shows the degree of human dependence, and vast impact, on the world's vegetation and soil: "Nor will all the wizardry of modern science and technology remove us from our reliance on vegetation." Yet despite the modern world's increasing need, "not more than one-tenth of the earth's land surface has the combination of climate, topography, and soil adapted to food crop production."

Sample items: The story of the stripping of the famous biblical cedars from the now bare hil's of Lebanon, illustrated by a dramatic photograph; the parallel disappearance of the forests of ancient Greece. In the United States alone, a million acres of potential crop lands are swallowed up each year by the growing cities. Fortunately the self-restorative powers of vegetation are very great; therefore improvements in attitudes toward the land, and in the management of its vegetation, should, where the soil itself has not been too profoundly damaged, make possible a significant recovery.

H. H. Bartlett's "Fire, Primitive Agriculture, and Grazing in the Tropics," recounts the great destruction there, and concludes that in the past man "knew no better than to do what has been found to be harmful. Now he knows better. He can take stock of what he has done and can plan for the future, before everything has been destroyed. . . . It would be idle to attempt to taboo all interference with nature, insofar as nature can be modified for the ultimate good of man. But ruthless destruction now for only fleeting advantage, followed by the everlasting depreciation of resources for the future, can only be condemned."

Andrew H. Clark's "The Impact of Exotic Invasion on the Remaining New World Mid-latitude Grasslands" contains an illuminating and significant review of the relationships, real and fancied, between overgrazing, dust storms, and floods in the far West.

F. Fraser Darling's "Man's Ecological Dominance through Domesticated Animals on Wild Lands" presents the thesis that grazing on a commercial scale on fenced lands as we know it today cannot continue without progressive deterioration of the habitat, and that where grazing over long periods has not damaged the land it has been of the unfenced nomadic type, as in Lapland. The

domestic reindeer crash in Alaska, which was conducted as a commercial operation under confined conditions, failed primarily for this reason, in marked contrast to the more normal ecological security enjoyed by the closely related but unconfined wild caribou.

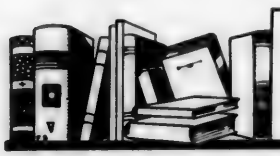
John C. Bugher's "Effects of Fission Material on Air, Soil, and Living Species" presents the Atomic Energy Commission's view of the situation; however some of the discussion indicated a different interpretation of the facts (p. 937).

Harrison Brown's chapter on "Technological Denudation" is an excellent introduction to his more inclusive book, previously mentioned.

This summary would hardly seem complete without mention of E. A. Gutkind's chapter, "Our World from the Air: Conflict and Adaptation," with its striking photographs. And as a sample of the many remarkable glimpses of human insight and learning which are scattered throughout this Symposium we may close with the discussion (pp. 1113-15), "Are the Earth and Life Unique?" which soberly concludes that "Keeping in mind that we have possibly a million billion solar systems and pessimistically guessing that only one out of a thousand has its planets not too close to the sun, is not too far away, not too large, and not too small for conditions in which life could emerge, there still would be a thousand billion planets possessing life."

Thus, if in addition to the long range view for our planet we take the cosmic view, man's mistakes and even man's self-elimination from this particular planet by no means remove all hope for "better worlds."

[EDITOR'S NOTE: *This excellent review of a very significant publication is reprinted by permission from The Living Wilderness, No. 63, Spring-Winter 1958.*]



Literature Briefs

Perspectives on Conservation: Essays on America's Natural Resources. Edited by Henry Jarrett. 250 pp., index. 1958. Published for Resources for the Future, Inc., by the Johns Hopkins Press, Homewood, Baltimore 18, Md. $5.

Here in book form are the essays and discussions presented during the 1958 Forum of Resources for the Future held in Washington, D. C. The essays explore some of the problems of conservation of the next fifty years from the vantage point of the past fifty. There were 23 authorities participating by invitation in the Forum organized under six topics: (1) the first fifty years; (2) science, technology, and natural resources; (3) resource demands and living standards; (4) urban growth and natural resources; (5) some determinants of resource policy; and (6) organizing for conservation and development.

This book will probably be one of the more stimulating and used of those recently issued under the sponsorship of Resources for the Future.

The Next Hundred Years. By Harrison Brown, James Bonner and John Weir. 193 pp., index, notes, bibliography, figures and tables. 1957. The Viking Press, 625 Madison Ave., New York 22, N. Y. $3.95.

Three well-trained scientists base this book upon their reports made to the directors of thirty of the USA's largest industrial corporations. The 18 chapters are the results of conferences among some scientists and industrialists.

Many questions are raised. The essence of one major conclusion of the studies is contained in this statement from the preface: "Intellectual rather than physical resources may eventually limit man's material progress."

Here is a book worthy of study by individuals and discussion groups. It should also be required reading for all students in college-level conservation courses.

The Missouri. By Missouri Basin Interagency Committee. 32 pp., fold map, illus., bibliography. Public Health Service Publication No. 604. 1958. U. S. Government Printing Office, Washington 25, D. C. 55c.

This is a very well prepared and illustrated publication, indicative of the current excellent publication-preparation work of the Public Health Service. The contents and a three-fold map with color legend are a worthwhile guide for those contemplating a trip to Rapid City, South Dakota, this August to attend the Soil Conservation Society conference. The booklet deals with an over-view of resources of one of the great river basins of the United States and how some of the resources are being used.

The Free Citizen. By Theodore Roosevelt. Edited by Hermann Hagedorn. 210 p., illus., Theodore Roosevelt Chronology, chapter references. Reprinted 1958. The Theodore Roosevelt Association, 28 E. 20th St., New York 3, N. Y. 35c.

The Building of TVA: An Illustrated History. By John H. Kyle, 162 pp., illus., index. 1958. Louisiana State University Press, Baton Rouge, La. $7.50.

In 1958 the Tennessee Valley Authority celebrated its 25th anniversary; here is a picture and word salute to a story that is known the world over. The author is editor of the Johns Hopkins Press and is an avid student of architecture. The book reflects primarily and excellently the architectural design of TVA.

Wildland Research in California—The Key to Better Resource. 33 p., illus. 1958. California Division of Forestry, Sacramento, California.

This concise, well-illustrated pamphlet outlines present problems of forest and range management, sketches extent of present knowledge, and lists research needs. The goal is sound economic knowledge of how to handle each type of wild land in California. As practical information is gained, demonstration areas are to be set up for each land type. An infinite amount of research is needed, as indicated by lists given. The bulk of the paper concerns forest management needs.

On This We Stand is a brief summary of the 1959 policies adopted by the National Grange during its 92nd annual session. Copies can be obtained free by writing The National Grange, 744 Jackson Place, N.W., Washington 6, D. C.

Principles of Field Biology and Ecology. By Allen H. Benton and William E. Werner, Jr. 341 pp., index, illus., supplementary reading lists for each chapter, glossary, appendix. 1958. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N. Y. $6.50.

Workbook for Field Biology and Ecology. By A. H. Benton and W. E. Werner, Jr. 268 pp., illus., indexed. Burgess Publishing Co., 426 S. 6th St., Minneapolis 15, Minn. $2.75.

(*From a review of these two books by* W. T. BARRY, *Billings, Montana.*)

Both of these books are well-organized and of real help to students in interpreting nature. They are particularly useful for those who will be teaching junior high and high school biology and science. Excellent index, illustrations, and a helpful section on how to select and handle a field problem, place these books high on the list for instructor and student use. The field manual is one of the best of its kind.

Plant Breeding and Cytogenetics. By Fred C. Elliott. 395 pp., index, illus., references by chapters. 1958. McGraw-Hill Book Co., 330 W. 42nd St., New York 36, N. Y. $8.50. (*From a review prepared by* KENNETH J. FREY, *Ames, Iowa.*)

The first six chapters deal with cytology and cytogenetics as these apply to plant breeding and evolution. The second part (seven chapters) covers plant breeding methods, tools and procedures. Some of the newer techniques of mutation breeding, polyploidy, and chromosome substitutions are discussed thoroughly in a thought-provoking manner.

There is an up-to-date treatment of "commercial" *bulk* and *pedigree* systems. Examples are given to illustrate methods and tools of plant breeding.

In order to understand this book, the reader should be well-versed in genetics, cytogenetics and statistics. The book will probably be more valuable as a reference than as a text for plant-breeding courses.

AUDIO-VISUALS

Rural Community Defense. 16 mm., sound, black and white, 13½ minutes. Released 1958. TV use permitted. (Available for loan from cooperating libraries of USDA. Film shows how farm families can plan *now* for survival—in event of enemy attack.

Water and Wildlife in the Prairie Pothole Area is a slide series with script. Can be obtained on loan from the state offices of the Soil Conservation Service in Minnesota, North Dakota and South Dakota or from one of the SCS field biologists.

★ ★ ★

Enclosed you will find $5 for which the Benge-Washtucna Soil Conservation District wishes to send the JOURNAL OF SOIL AND WATER CONSERVATION *to Washtucna Public School, Washtucna, Washington.* WALTER D. HOEFEL, *Secretary.*

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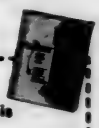

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California Lands, Ownership, Use and Management. By Samuel Trask Dana and Myron Krueger. 308 pp., index, 50 tables, 31 figures, end maps showing types of land ownership, frontispiece map of vegetation types of California, 1945. Appendices: Chronological summary of federal and state legislation, and annotated bibliography. 1958. The American Forestry Association, 919 17th St., N.W., Washington 6, D. C. $4.50.

Although this foundation-sponsored publication and study prepared by two eminent foresters will be largely of value to California, it will serve to guide other states in looking at "patterns of land ownership," development of sound land-use policies, research, and practice. This California study is the first of a proposed series which eventually will embrace all the United States. In view of this, the book is worthy of widespread and intensive study. Critical evaluation should be forthcoming from many individuals, organizations, and agencies involved in land-use studies and action programs, particularly since this "pilot" study may set strong tones and patterns to be followed in future studies.

Forest Credit in the United States/A Survey of Needs and Facilities. Report of a committee appointed by Resources for the Future, Inc. 164 pp., index, 6 tables, 2 charts. Appendices: The Forest Situation Outlook, Earlier Studies and Proposals, Analysis of Questionnaires on Forest Credit, Case Studies of Forest Properties Involving Forest Credit, Recent Modifications of the Laws and Regulations Relating to Bank Loans for Forest Operations, Some Considerations for Lenders in Making Timber Loans and Mortgage Loan Provisions. Selected references and bibliography. 1958. Resources for the Future, Inc., 1145 19th St., N.W., Washington 6, D. C. $2.

On many of the private and smaller forests of the U. S. A., significant improvements can be expected if credit facilities and policies become adequate. Foresters, other land-use workers, legislators, and credit agencies, will find this book useful. It will aid in seeking necessary revisions in forest-credit policies and laws on state and national levels.

Conservation and Resource-Use Education. Joint Council on Economic Education, 2 West 46th St., New York 36, N. Y. 234 pp., roster of attendance, list of films viewed, bibliography, not indexed. (No date.) $2.50.

This is a processed report of a workshop involving representatives of nine school systems participating in the Joint Council's project "CRUE" (Conservation and Resource-Use Education). The workshop, with 58 persons from 24 states was held July 8-17, 1957, at Antioch College. Included in the report are the background speeches, discussions, and summaries of "representative experiences in conservation and resource-use education" at elementary, junior high, and high school levels. Several committee reports are included, with one on a "proposal for developing resource-use education through the establishment of collegiate centers." Summaries were made by Joseph L. Fisher of Resources for the Future (a grant from RFF has made CRUE possible) and George L. Fersh, director of CRUE for the Joint Council. A valuable report.

Land Judging. By Edd Roberts. 120 pp., illus., not indexed, glossary. 1955. The University of Oklahoma Press, Norman, Oklahoma. $2.50.

The author, an active member of the *SCSA*, has based this useful guide on personal experience in the conduct of many soil and land judging contests, and in teaching and developing land judging. Land judging is a notable advance in rural conservation education methods and is now practiced in all states, with many well-trained teams competing in state, regional and national contests. A modified form of land judging adapted to urban boys and girls might be a next step.

Water Resources and the Law. University of Michigan Law School, Ann Arbor, Michigan. 614 pp., not indexed. 1958. Paper-bound. $5.

This volume combines the written contributions prepared for the Tenth Annual Summer Institute of the Michigan Law School held in September, 1957, eleven monographs, and the Model Water Use Act prepared by staff members of the Law School Legislative Research Center. A wide range of subject matter representative of the views of both the engineering and legal professions is covered. An appendix includes the Mississippi Conservation and Development of Water Resources Act and the Iowa Natural Resources Act which is concerned with water.

Land, Forest, Wildlife. Published 6 times a year by Dept. of Lands and Forests, Natural Resources Bldg., Edmonton, Alberta, Canada. Vol. 1, No. 1, 28 p., illus., April-May, 1958.

A well-printed magazine of 9 x 6 inches designed to inform the public about the management of Alberta's renewable resources.

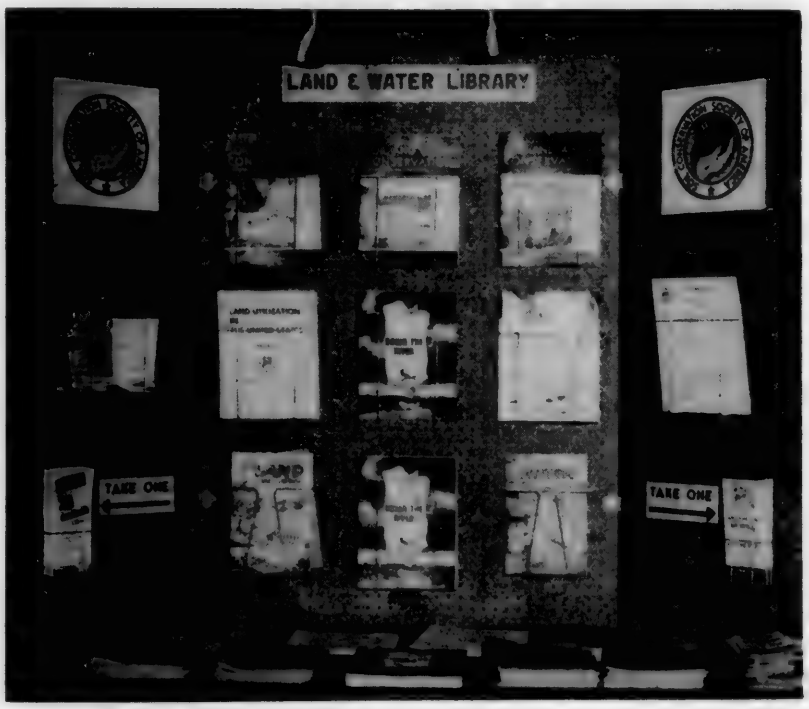
The Program to Eradicate the Imported Fire Ant: Preliminary Observations. By John L. George. 39 pp., processed. 1958. The Conservation Foundation, 30 East 40th St., New York 16, N. Y. (No price given.)

An impartial study pointing out the apparent lack of research by the USDA prior to instituting a program that is slated to cost over $100,000,000 over a 25-year treatment period and on which there are strong conflicts of opinion as to worth, methods and results.

A Flora of the Marshes of California. By Herbert L. Mason. 878 p., 367 figures. 1957. University of California Press, Berkeley, California. $10.

An excellent, important manual that will be of great value in much of the West. It will also be of reference value elsewhere in the U. S., for many wetland plants are of wide distribution and the book presents results of critical studies.

***(BELOW)*—EXHIBIT OF SCSA PUBLICATIONS WAS PREMIERED AT ASHEVILLE. THE CENTER PANEL IS A MODEL FOR A SCHOOL "LAND AND WATER LIBRARY" PROJECT FOR CHAPTERS**



News Notes

INFORMATION ON 1959 CONVENTION

Plans are developing for the Society's 14th Annual Meeting to be held in Rapid City, South Dakota, August 26 to 28. (Note the dates—26 to 28.) It is anticipated that many families will want to combine their vacation with the convention and the local committee is planning accordingly. The Black Hills and the Badlands of the Dakotas offer real vacation and scenic opportunities. *Society* members arriving in Rapid City will travel through interesting country to reach the convention city, especially those driving by car.

From the West, conventioners will travel through the Rockies, be near Yellowstone, the Tetons and other national parks as well as national forests. Those driving from the South or North will see the Black Hills while those from the East will visit the Badlands and perhaps the Missouri River dams that have been constructed in recent years.

Travel Connections

Rapid City will be served at convention time by three airlines(two will start operation in April so don't make a flight reservation now.) Western Airlines has connections from Minneapolis, Casper, Salt Lake City, Los Angeles, and San Francisco.

North Central Airlines will serve Rapid City with connections from Minneapolis, Duluth, and Sioux Falls. Frontier Airlines will offer connections from Denver, Cheyenne, Bismarck, and Minot.

Rail service into Rapid City is primarily from Chicago via the Chicago-Northwestern Railroad with connections at Huron and Mankato. Rapid City is served only from the East by direct rail service. Excellent bus service is available from all points.

Other Information

Other information you may need to develop your plans include:

1. A central housing committee composed of Society members will secure your housing accommodations. Hotel housing is somewhat limited but several motels are within walking distance of the convention meeting and literally hundreds of others are within a short drive. Motels are of all types—motels on the highway, off the highway, with or without kitchens, with or without swimming pools. They are offering special rates to Society members at a very busy season. The height of the tourist season is just in advance of the Labor Day weekend and Society members will find it to their advantage to *make their reservations early—it is the only way reservations can be assured.*

2. Special housing information forms will be mailed to all members on or about May 15. Information will also be carried in the May JOURNAL. The housing committee has been assured of 1,200 rooms that will be held for the convention until July 1, at which time the rooms will be rented to other parties if there is a demand.

   If you desire to contact the housing committee about reservations in Rapid City in advance of the time the information is mailed to you, you may write to Harlin Collins, P. O. Box 1212, Rapid City, South Dakota.

   If you desire to stay in the Black Hills outside of Rapid City, it is suggested you contact Paul Besselievre, Manager, Black Hills and Badlands Association, Sturgis, South Dakota, for a directory of facilities and make your reservations direct.

   Should your family desire information on camping facilities, you should contact Harry Woodward, Director, State Game, Fish and Parks Department, Pierre, South Dakota.

3. The meetings will be held in the Rapid City High School just two blocks from downtown Rapid City and within walking distance of two hotels and at least ten motels. The high school has fine meeting facilities for 1,500 people. A medical clinic is two blocks away. Numerous cafes are handy and luncheon arrangements are planned at the high school for the convenience of visitors who desire to take it there.

   Registration will start at 4:00 p.m. on August 25 and will continue throughout the meeting. Registration will be in the high school building. Plenty of parking lots are available near the high school and street parking is permitted in the vicinity of the school. The Chamber of Commerce will provide courtesy parking stickers for all visitors.

4. Chapters or groups desiring a breakfast or luncheon for their delegation are advised to make contact direct with D. E. McKinstry, Assistant Manager, Sheraton-Johnson Hotel, Rapid City. McKinstry states that he will serve breakfast to organized groups for $1.25, plus gratuity. Lunch is priced accordingly. While there are many cafes, they will taxed to capacity with the convention and tourist crowds in the city. Groups using breakfast sessions for their delegates will have good fellowship and be served promptly. The Sheraton-Johnson has the following facilities available for meals:

Ballroom No. 1	Capacity, 100
Ballroom No. 2	Capacity, 100
Crystal Room	Capacity, 100
Jade Room	Capacity, 15
Mural Room	Capacity, 20
Hill Room	Capacity, 40
Rushmore Room	Capacity, 25
Dakota Room	Capacity, 20

   There are other facilities for group luncheons and you can secure this information from the local arrangements committee in Rapid City. *Please handle your delegation arrangements for meals direct with the hotels and your housing requests direct with the housing committees.*

5. The convention is planned as a family affair in late August prior to the start of school. Rapid City and the Black Hills have many attractions.

   The committees are giving this consideration and plans are being made for wives and families. A committee of ladies in South Dakota are making extensive plans for visiting ladies. Three public swimming pools are located in Rapid City; numerous parks, an Indian Museum, and the museum at the School of Mines provide interesting places to visit. During the banquet provisions will be made to feed and care for children at one of the modern church educational buildings. Families and other convention registrants are advised dress is casual but to come prepared for hot weather in the day time and very cold nights.

6. Registrants at the meetings and wives and families may participate in the barbecue to be handled by the South Dakota Chapter. This is a real Western pit barbecue with servings of choice South Dakota beef. The barbecue lo-

cation will be on the grounds of the Black Hills Passion Play, Thursday, August 27, by special invitation of Joseph Meier, who portrays the Christus in the play. This is at Spearfish where the group will complete an afternoon tour by bus of conservation points of interest. Others may prefer to spend the afternoon with their families and drive their personal car to the barbecue.

Following the barbecue, convention registrants will attend the Passion Play at a special price—tickets to be purchased in advance at the Society's registration desk. Plan to see the Passion Play during the convention instead of alloting time in advance of the meeting.

* * *

All of you will want to register. There will be no registration fee for ladies or children. The usual $3.00 registration fee will be charged men, members, and non-members, but it will authorize them to receive copies of the papers, to participate in the tour and to purchase the barbecue tickets and the Passion Play tickets at a special price. Wives and children who register will be entitled to these special prices.

7. Chapters are encouraged to prepare an exhibit. Write Mike Craig, Soil Conservation Service, Spearfish, South Dakota, for additional information. Society, chapter, agency, and commercial exhibits will be a part of the meeting.
8. Special ceremonies will be held on August 26 to introduce the soil conservation commemorative stamp which your family will want to witness.
9. Each Society member will receive one "official" first-day cover envelope for the commemorative stamp with the mailing of the convention material in May—along with instructions as to how to have it postmarked in Rapid City on the first day the soil conservation stamp is sold regardless of whether or not you attend the convention. The Black Hills Stamp Club will have other covers for sale at the meeting.
10. Featured at the meeting will be a South Dakota wild-game snack supper to be served courtesy of South Dakota members on Wednesday, August 26. A mixer and entertainment will be held that evening so all may get acquainted. The game-feed will be open to registrants only and you will not want to miss it.

Plan now to attend the Society's 14th Annual Meeting in Rapid City, South Dakota, August 26 to 28.

SOCIETY COMMITTEES AND CHAIRMEN

Advertising—Fred L. Bull, Symons Hall, University of Maryland, College Park, Md.
Annual Meeting Program—H. G. Bobst, Rm. 604, 134 S. 12th St., Lincoln, Nebr.
Annual Meeting Local Arrangements—John T. Loucks, Box 1671, Rapid City, S. Dak.
Annual Meeting Publicity—Norman A. Berg, Box 1357, Huron, S. Dak.
Archives—T. S. Buie, 3120 Duncan St., Columbia, S. C.
Awards—H. A. Hopper, 3374 Mt. Diablo Blvd., Lafayette, Calif.
Booklet Sales—Jack L. Barrick, 18 North Willard St., Burlington, Vt.
Chapter Activities—I. O. Hembre, State Soil Conservation Commission, Agriculture Hall, College of Agriculture, Madison, Wis.
Elections—R. A. Wilcox, 405 Iowa Bldg., Des Moines, Iowa.
Fellows and Honorary Members—J. C. Dykes, Soil Conservation Service, South Agriculture Bldg., Washington 25, D. C.
Finance—Minott Silliman, Jr., 929 S. Myrtle St., Kankakee, Ill.
Housing—J. S. Russell, Des Moines Register & Tribune Bldg., Des Moines, Iowa.
International Relations—Glenn K. Rule, Soil Conservation Service, South Agriculture Bldg., Washington 25, D. C.
Land Utilization—Frank Schaller, 131 Agronomy Bldg., Iowa State College, Ames, Iowa.
Membership—George L. Winchester, Soil Conservation Service, Box 1226, Raleigh, N. C.
National Office Procedures—Carl H. Dorny, Soil Conservation Service, South Agriculture Bldg., Washington 25, D. C.
Nominations—Herbert A. Flueck, Soil Conservation Service, Federal Courts Bldg., St. Paul 2, Minn.
Organization and Policy—Roy D. Hockensmith, Soil Conservation Service, South Agriculture Bldg., Washington 25, D. C.
Professional Training—Arnold W. Bolle, School of Forestry, Montana State University, Missoula, Mont.
Program Development—Elmer L. Sauer, 207 Davenport Hall, University of Illinois, Urbana, Ill.
Society Policy—Lloyd E. Partain, The Curtis Publishing Co., Independence Square, Philadelphia, Pa.
Spanish Glossary—William H. Gracia, Apartado 4671, San Juan 23, P. R.
Special Publications—D. Harper Simms, Soil Conservation Service, South Agriculture Bldg., Washington 25, D. C.
Student Chapters—Bernard L. Clausen, School of Natural Resources, University of Michigan, Ann Arbor, Mich.
Water Resources Management—Walter C. Gumbel, Monongahela Power Co., Fairmont, W. Va.
Wetlands Classification—Cyril Kabat, 1218 E. Mifflin St., Madison, Wis.

The *Society* also has representation with the following organizations, with the *SCSA* representative named:

American Association for Advancement of Science—Donald A. Williams, Soil Conservation Service, South Agriculture Bldg., Washington 25, D. C.
Natural Resources Council—Edward H. Graham, Soil Conservation Service, South Agriculture Bldg., Washington 25, D. C.
Policy Committee for Scientific Agricultural Societies—John W. Barnard, 4306 Underwood St., University Park, Hyattsville, Md.
American Grassland Council—B. D. Blakely, Soil Conservation Service, South Agriculture Bldg., Washington 25, D. C.

NOMINATIONS DUE APRIL 30, 1959

Nominations are being accepted for *Society* office and Council positions by Herbert A. Flueck, Chairman of the Committee, 517 Federal Courts Building, St. Paul 2, Minnesota.

Nominations are open for: President, First Vice-President, Second Vice-President, Treasurer, one Council Member at-large, one Council Member for the Southeast Region, and one for the Great Plains Region.

—— SCSA ——

To the Editor:

Mrs. Phoebe Harrison's article in the November, 1958, JOURNAL gave a most interesting summary of district organization throughout the world.

Watershed organization in Ontario, Canada, to bring the information up to date, comes under the Conservation Branch, Department of Planning and Development. It is this branch which supervises the vote for the formation of an authority, which carries out the integrated survey of all phases of conservation, makes recommendations for action to the authorities, staffs them with field officers and handles applications for grants-in-aid from the province.

Advice and assistance from other departments, particularly Agriculture and Lands and Forests, are freely available.

In view of the annual meeting of the *SCSA* to be held in Ontario in 1960, your readers will be interested in these administrative details. . . . Interest in watershed development is increasing rapidly. . . . Ontario now has 25 Conservation Authorities.

A. H. RICHARDSON,
Chief Conservation Engineer, Toronto, Ontario

CHAPTER ACTIVITIES CONTEST—1959

In 1959 the Society will continue its program to recognize the work of the chapters. Recognition will be provided the outstanding chapters in the six regions. To enter, a chapter needs to prepare an account of either its total program or a single outstanding activity. This award is designed to encourage chapters to develop programs promoting the Society objectives. Information on these activities will be made available to all chapters for the guidance and help it may give them. From the regional winners, a Society-wide winner will be selected.

Student chapters are encouraged to enter this contest. Their entries will be judged independently in a student chapter contest on a Society-wide basis.

What Is the Award?

Certificates of merit will be awarded by the Society to (1) the regional winners and (2) to the Society-wide winner. A traveling banner will be presented each regional winner and the top winner. The banner is to be returned to the executive secretary's office one month prior to the annual meeting. Honorable mention will be accorded other outstanding entries.

Regional and Society-wide publicity will be offered all winners in the JOURNAL and the public press.

Who Should Enter the Chapter Activities Contest?

Every chapter should enter. The best way to improve your chapter activity is to "get in the contest and compete." What you are doing in your chapter will be of value to other chapters. "Give and receive" is our policy. It's a two-way street.

How Do You Enter This Contest?

There are two ways a chapter may enter this contest:

(a) Prepare an account of its total chapter program, or

(b) Prepare an account of a single outstanding chapter activity.

The judges will be instructed to recognize that a strong single activity may win over an average over-all program.

What Do You Submit?

The account of the chapter's entry may be submitted in bound or looseleaf form. It may include a narrative of the project or program and may be supported by photographs, maps, copies of programs, press releases, charts, tables, summaries, and other similar material. A table of contents itemizing the materials submitted in the account is required.

(a) One copy of the account is sufficient to submit. It is suggested, but not required, that a second copy be made for the use of the local chapter.

(b) Do not include in your account original papers or documents which are irreplaceable or of historical value. Have photostats or duplicates made and so marked for entry into the contest.

(c) All account entries will be returned. However, because of the necessity of passing these items around, the Society office and its committees or representatives cannot be held responsible for the material. Every possible precaution will be taken to return the entries intact and in good condition.

(d) The entry must be current with some part of it carried on during the 18 months prior to August 26, 1959. Any project completed prior to February 26, 1958 is not eligible in the contest.

(e) The top winner in 1958 is not eligible to enter the same account again.

(f) Other regional winners for 1958 are eligible to re-enter the same account if it is current and brought up to date.

(g) Uniformity of presentation is not necessary. Initiative, originality, and ingenuity are encouraged.

When Is Entry Due?

Your entry must be mailed to arrive at the Regional Council member's address not later than July 1, 1959! Regional committees will judge the regional entries. The council member in your region is listed along with states or provinces in each region of the Society.

The council member will send his regional winning entries to the chapter activities chairman on or before July 22, 1959. The Society-wide winners, selected by a Society committee and the regional winners will be announced at the annual meeting in Rapid City, South Dakota.

What Is Your Region?

Northeastern Region—New York, Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Pennsylvania, New Jersey, Rhode Island, Delaware, Virginia, Maryland, West Virginia, and the District of Columbia. (Mail entry to: JOHN BARNARD, 4306 Underwood St., University Park, Hyattsville, Md.)

Southeastern Region—Arkansas, Tennessee, North Carolina, South Carolina, Louisiana, Mississippi, Georgia, Alabama, Florida, Puerto Rico, and the Virgin Islands. (Mail entry to: A. H. VEAZEY, P. O. Box 5126, Raleigh, North Carolina.)

North Central Region—Minnesota, Wisconsin, Michigan, Iowa, Illinois, Indiana, Ohio, Missouri, and Kentucky. (Mail entry to: MINOTT SILLIMAN, JR., 929 S. Myrtle, Kankakee, Ill.)

Great Plains Region—Montana, North Dakota, South Dakota, Wyoming, Nebraska, Colorado, Kansas, New Mexico, Oklahoma, and Texas. (Mail entry to: H. G. BOBST, Room 604, 134 S. 12th St., Lincoln 8, Nebr.)

Western Region—Washington, Oregon, Idaho, California, Nevada, Utah, Arizona, Hawaii, and Alaska. (Mail entry to: HERBERT A. HOPPER, 3374 Mt. Diablo Blvd., Lafayette, California.)

Canada—New Brunswick, Quebec, Ontario, Manitoba, Saskatchewan, Alberta, and British Columbia. (N. R. RICHARDS, Ontario Agricultural College, Guelph, Ontario.)

Student chapters should sent their entry direct to the chapter activities chairman, I. O. HEMBRE, Room 1, Soils Bldg., University of Wisconsin, Madison 6, Wisconsin.

If you have questions, please direct them to the chairman of the chapter activities committee, I. O. Hembre.

EDITORIAL BOARD CHANGES

Changes have been made in the Editorial Board of the JOURNAL. Terms for Walter C. Gumbel, Ben O. Osborn, and A. D. Stoesz expired at the end of 1958. Osborn was reappointed through 1961 and is currently serving as chairman.

Bernard Frank, now in India as a Forestry Officer with FAO of the United Nations, resigned from the Board in January. His term will be filled out by Edward A. Johnson of the U. S. Forest Service with headquarters in Columbus, Ohio.

Newly appointed to the Board to serve through 1961 are Maurice L. DuMars who now heads up the information work of the Agricultural Research Service, USDA, Washington, D. C. and Frank H. Mendell, state conservationist of Iowa with office in Des Moines.

Members of the Editorial Board review all major manuscripts and technical notes submitted to the JOURNAL. They also solicit manuscripts and suggest to the Council improvements in matters related to the JOURNAL. The Board meets during the annual convention and the chairman prepares semi-annual reports for the Council. Since the beginning of the JOURNAL the Editorial Board has been a most helpful and constructive group devoting much time to the reviewing of many manuscripts.

CHAPTER NEWS

California Chapter held its first annual meeting January 14 in conjunction with the state meeting of the Soil Conservation Districts. Awards, report of national council activities, and presentation of Club-5 pins were featured. William W. Donnan of ARS spoke on "Inside Russia."

The chapter presentation was considered by all present to be a most inspiring ceremony. Herb Hopper, councilman for the Western Region, made the presentation of the charter for this newly-formed all-California chapter.

Washington, D. C. No. 1 Chapter meets regularly each month. Honorary memberships in the chapter were presented to Ervin L. Peterson and Herschel D. Newsom by Richard E. McArdle. Associate Chief of the Geological Survey, R. L. Nace, gave a talk on water resources and ground water supplies.

The **Seminole sub-chapter** of the **Florida Chapter** cooperated with the Soil Conservation districts in southern Florida in producing a monthly newsletter for October.

Idaho Chapter held its annual meeting in December and elected the following officers: Chairman, Morlan W. Nelson; J. Boyd Price, Vice-Chairman; Luther Jones, Secretary-Treasurer. Incidentally, one of Morlan's peregrine falcons was featured in a Disney film which has been given TV release.

Old Line Chapter (Maryland) presented a plaque to Martin Gordon, Flintstone, Maryland, and named him outstanding conservationist for 1958 in Maryland at their annual meeting held in January. "Research and Field Trials on Improved Soil Conservation Work" was a panel presentation with many slides used by Clarence Britt, Marshall Augustine, Joseph Ruffner, Clarence Slater and Robert Broach. P. Mitchell Coale is the 1959 president of the chapter.

Michigan Chapter met at Michigan State University on February 5. Elections are now conducted by mail balloting. Conservation education was featured in the morning sessions of this annual meeting, with Carl Knopf, Robert George, Hale Pearce and Robert Belcher participating. The afternoon sessions were devoted to water management with Dan Reed, C. R. Humphrys and Raleigh Barlowe discussing general and legislative aspects.

Show-Me Chapter (Missouri) had a most appropriate (in view of the cover photo on this Journal) feature story on soil scientists. It was titled: "Have Auger —Must Travel."

Inland Empire Chapter (Montana and Washington) is experimenting with a new approach to summer programs. The area of the chapter is divided into seven parts, each with two co-chairmen. Each part will set up a program of "sectional" interest. Six members received Club-5 awards, with 50 new members gained in 1958. The youth camp is set for June 7-12 at Camp Wooten on the Tucannon River. Cost is $30 per boy based on enrollment of 50. Warren A. Starr is chairman of the camp committee, 454 Holland Library, Pullman, Washington. Soil Conservation Districts will sponsor most of the boys.

South Dakota Chapter held its annual meeting at Huron on January 30 and 31, with more than 250 members registered and nearly 500 attending the banquet. Twenty-three members received Club-5 awards. The chapter also received its commission on the sale of 50,000 copies of *The Wonder of Water*.

Considerable time was spent at the meeting in preparing for the international convention of the Society to be held in Rapid City, August 26-28, 1959.

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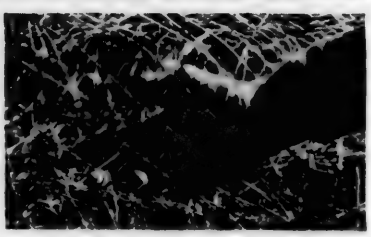

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NEWS OF MEMBERS

Lyle T. Alexander, Soil Conservation Service, Beltsville, Maryland, was one of the ten government employees to receive the 1959 Career Award from the National Civil Service League. Only one Department of Agriculture employee is so honored each year.

L. T. Alexander

Harold G. Wilm, *SCSA* member at Syracuse University has been appointed commissioner of the New York State Conservation Department by Gov. Nelson Rockefeller.

(Above) SCSA member, **Dwight W. Meyer** *(right)*, Director, Food and Materials Requirement Division, Commodity Stabilization Service, USDA, Washington, D. C. visits the SCSA office in Des Moines. He examines a copy of the JOURNAL held by the editor and comments favorably on a "conservation reserve" article.

Paul Walser, Temple, Texas, was given the "Man of the Year in Texas Agriculture" award by *The Progressive Farmer*. **Tom Buie** was given the same award in South Carolina.

Vernon A. Young, charter member, recently retired from active teaching at the Texas A & M College, College Station, where he had been Head of the Range and Forestry Department.

J. H. Stoeckeler, senior soil scientist with the Lake States Forest Experiment Station, University Farm, St. Paul, Minn., has been granted a senior postdoctoral National Science Foundation fellowship for one year of study of ecological and hydrological aspects of the drainage of forest swamps in Europe. Finland, Sweden and Germany are included in the itinerary.

Walter Gumbel, Fairmont, West Virginia, has been named to the State Soil Conservation Committee in West Virginia.

Arthur W. Greeley (SCSA member) has been appointed assistant chief of the USDA Forest Service with offices in Washington. Formerly regional forester at Milwaukee, Greeley succeeds **Howard Hopkins** who retired July, 1958. Succeeding Greeley at Milwauke is M. M. Nelson.

The "Soil and Agriculture" symposium arranged by Section O (Agriculture) of the American Association for Advancement of Science meeting held in Washington this past December represented a rather thorough exploration of many of the problems involved. **Roy Hockensmith,** serving as Chairman of this Section, arranged the two-day program of 16 invited speakers.

COMING EVENTS

Sixth National Watershed Congress, Statler Hotel, Washington, D. C., May 25-27, 1959. Many *SCSA* members will be present, with the *Society* active as a sponsor of this meeting.

The Triennial Technical Conference of the U. S. National Committee of the International Commission on Irrigation and Drainage (ICID) will be held May 11 and 12 at Reno, Nevada. Further information about the conference may be obtained from Stephen H. Poe, Executive Secretary, U. S. National Committee, ICID, Box 7826, Denver 15, Colorado.

The 1959 **Northeastern Wildlife Conference** will be held at Oglesby Park, Wheeling, West Virginia, April 19-22.

Midwest Conservation Conference will be held at the Wisconsin Center, University of Wisconsin, October 23-25, 1959. Conservation instructors at all levels and particularly those concerned with teacher training from the states of Iowa, Illinois, Minnesota and Wisconsin will attend. Further details can be obtained from Frank Brown, Wisconsin Department of Public Instruction, Madison 1, Wisconsin.

Fifth World Forestry Congress will be held late in summer of 1960 at the University of Washington in Seattle, Washington. It is sponsored by the United States Department of State and FAO (United Nations). "Multiple-Use Forest Management" is the theme.

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nitra-coat

New Method of Inoculating Can Mean Difference Between Success and Failure of Some Legumes

EFFECTIVE nodulation of small-seeded legumes is not always easy to achieve, even with today's improved inoculants. This is especially true with some of the small-seeded legumes such as Birdsfoot trefoil which are planted on the surface of the soil.

Hot, dry soils make effective inoculation difficult to attain in many areas and with many legumes. The bacteria die off before the seeds germinate and cannot benefit plant growth.

But, a new product, Nitra-Coat, can now be "teamed up" with legume inoculants to help assure effective nodulation in the face of these difficulties. Nitra-Coat used in the inoculant slurry can greatly improve inoculation results on the hard-to-inoculate legumes and on all legumes planted under adverse conditions.

What Nitra-Coat Does — Nitra-Coat is a special formulation of water-soluble gums, bacteria nutrients and calcium compounds. When mixed in the inoculant-and-water slurry, it adds adhesiveness to the inoculant and also prolongs bacteria life on the seed. The gums bind the inoculant tightly to the seed with a smooth, fast-drying coat — protect the bacteria. As a result, seeds flow smoothly through drills without clogging — the inoculant does not dust off.

Permits Inoculation Well in Advance of Planting — The life-sustaining nutrients and the adhesive qualities of Nitra-Coat give the legume farmer another big advantage — especially with large, easy-to-inoculate seeds such as soybeans or peas. Seeds may be planted as much as two weeks after inoculation and still attain adequate nodulation. This eliminates the need to re-inoculate when planting has been delayed by inclement weather, and, of course, makes it unnecessary to do the inoculating right on planting day. Valuable planting time is saved; the inoculating becomes a "rainy day" job.

This feature, therefore, discourages the "half-way" inoculation methods often used because of pressure of time. It will encourage many farmers previously skipping inoculation entirely to take full advantage of this sound farming practice.

Low Cost — The Nitra-Coat method of inoculation adds little more labor to preparing the slurry, and the expense is negligible. The added cost of Nitra-Coat averages from 5 to 10 cents per acre. No special mixing equipment is required.

Because the time factor in inoculation has been, for the most part, eliminated with Nitra-Coat, legume seed can now be custom inoculated by seed dealers. The stabilizing effect of Nitra-Coat in the slurry makes it practical to use slurry treaters and other large-volume mixers. Seed can be inoculated quickly, simply, at low cost to the farmer — and most important, more thoroughly than he would be likely to do himself.

The Nitragin Company,
3281 West Custer Avenue,
Milwaukee 9, Wisconsin

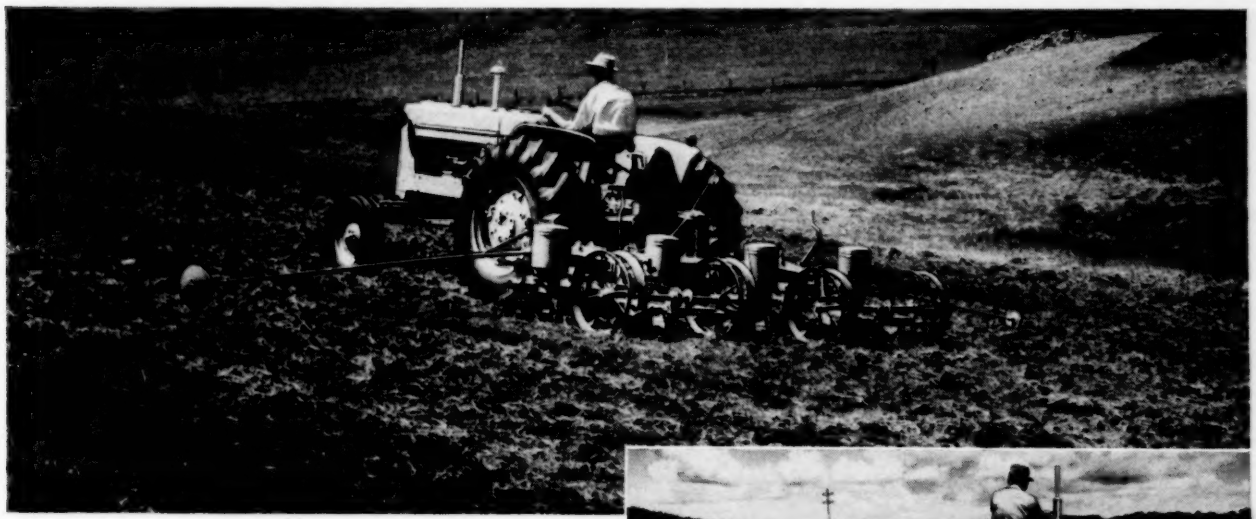
NITRAGIN

1131

WATERSHED FARMING:

Modern farm equipment meets today's urgent need for proper land treatment above flood control structures

With organized watershed programs under way all over the nation, there is a new emphasis on upland treatment to prevent the silting of expensive structures. To meet this demand for more effective erosion control, Allis-Chalmers offers modern machinery that makes conservation farming easier and safer than ever.



The new low-line D Series tractors provide low-set stability for safe, sure operation on sloping land. The 4-row drill planter, shown seeding corn on the contour, is of a flexible design that permits it to operate in terraced fields with ease, and without skips in the rows being planted.

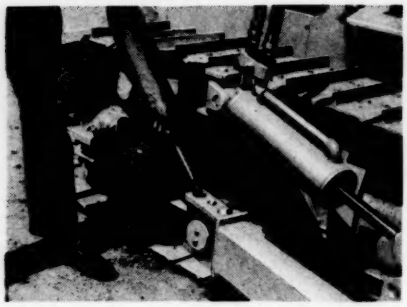
For small grain planting in strips and contours, and for grass seeding, the ALL-CROP drill provides unusual speed and precision. Exclusive Twin-Boot design permits separate banding of fertilizer with grain and/or grass seed — to give seedlings a fast start, without "burning."

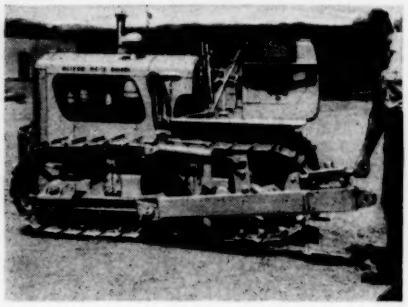
New tillage tools — tractor-mounted or semi-mounted, and hydraulically controlled — provide for quick lifting of implements and easy transport over grassed waterways. The free-swing, single-point hitch permits disc plows (illustrated) and other implements to follow contours easily.

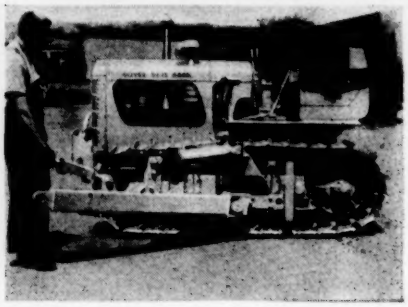
ALL-CROP is an Allis-Chalmers trademark

Yes, Allis-Chalmers machines for planting, tillage and harvesting all aid the trend toward conservation treatment of the land above flood water retarding structures. The Allis-Chalmers dealer in your community has the kind of equipment that will help greatly in the operation of an effective conservation program. Talk it over with him . . . soon. Allis-Chalmers, Farm Equipment Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS



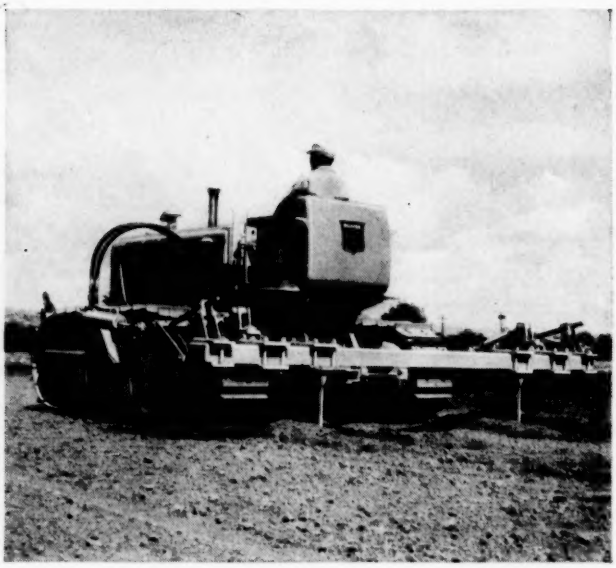




Pull a pin and just swing the beams around to front—or rear. Takes but a minute or two.

Dozing to deep tillage in minutes with

OLIVER TEAMED-POWER



Here are the brawniest crawlers you've ever handled—with the handiest arms you've ever used. And a switch from push to pull takes only minutes. You'll realize *more* from every field conservation job with a double-duty Oliver crawler—in clearing and forming, in cultivating and furrowing your land. For all these advantages, put Oliver TEAMED-POWER to work today.

THE POWER: Your choice of two work champions in their class—the husky 61 horsepower OC-12 or the big 110 horsepower OC-15. Their smooth, short-stroke, 6-cylinder diesel engines (or gasoline in the OC-12) pack an extra wallop, keep going steadily as loads build up. Both are equipped with Oliver "Spot-Turn"—a silky, long-wearing, running-in-oil clutch. Handy controls, roomy platform and foam-rubber seat make daylong operation a pleasure.

THE EQUIPMENT: For the front—the low-cost, high-lift, deep-dig dozer. Blade pitch and tilt are quick and simple to adjust. For the rear—a sturdy tool bar, with easy-set clamps and gauge wheels, takes the full range of attachments: ditcher, chisel, ridger, subsoiler, cultivator, lister, etc. But for the earth movers and tillage equipment that suit your needs best, consult your Oliver dealer.

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